Operation Return to Duty: Developing and Validating an Instrument to Assess Soldiers' Mental Readiness to Resume their Duties Following Injury Rehabilitation

A Dissertation
Presented in Partial Fulfillment of the Requirements for the
Degree of Doctorate of Philosophy
with a
Major in Education
in the
College of Graduate Studies
University of Idaho
by

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December 2018

Authorization to Submit Dissertation

This dissertation of Julianne Giusti, submitted for the degree of Doctorate of Philosophy with a Major in Education and titled "Operation Return to Duty: Developing and Validating an Instrument to Assess Soldiers' Mental Readiness to Resume their Duties Following Injury Rehabilitation," has been reviewed in final form. Permission, as indicated by the signatures and dates below, is now granted to submit final copies to the College of Graduate Studies for approval.

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Abstract

The U.S. Armed Forces places strong emphasis on military readiness and fiscal spending, which are both detrimentally impacted by the increasing number of injuries suffered by service members (SMs; Booth-Kewley, Larson & Highfill-McRoy, 2009). As injuries continue to mitigate military readiness, it is vital to understand the psychological processes of injury and injury rehabilitation. Because evidence supports the divergence of mental and physical readiness to return from injury, Manuscript 1 sought to identify the underlying components of mental readiness to RTD. A qualitative investigation, incorporating focus groups and one-on-one follow-up interviews of (previously) injured SMs provided depth and greater practical understanding of this concept. The information derived from Manuscript 1 informed the processes of Manuscript 2, which involved item development and refinement of the Military Mental Readiness to Return from Injury Instrument (MMRRII) using Exploratory Factor Analysis (EFA) and Exploratory Structural Covariance Modeling (ESCM). Results from Manuscript 2 provided preliminary support for factorial validity of a 3 factor (i.e., Support, Autonomy, and Competence), 12-item version of the MMRRII. Manuscript 3 furthered the validation process of the MMRRII using advanced multivariate statistical analyses, including: K-means cluster analysis, Multivariate Analysis of Variance (MANOVA) and follow-up univariate analysis of variance (ANOVAs). Results indicated four distinct Mental Readiness profiles, labeled: (a) Mentally Prepared (MP), (b) Mentally Prepared- Low Autonomy (MPLA), (c) Mentally Unprepared- High Autonomy (MUHA), and (d) Mentally Unprepared (MU). These profiles demonstrated statistically significant differences across three demographic variables, including: perceived mental readiness, recovery time, and injury severity. Results were discussed in light of limitations and future directions.

Acknowledgments

I'd like to express my deepest heartfelt gratitude to the mentors who have provided continuous opportunities for me to grow and expand in my pursuit of knowledge.

Dr. Burton, you have not only provided the opportunity for me to pursue a doctoral degree, but you have groomed me to be a more well-rounded professional. Your encouragement and understanding was vital to my success. I truly appreciate that you took a chance on me.

Dr. Pickering, you challenged me in ways I never thought I'd surpass and your support during the process was integral. I have skills that I never even knew existed and a new found confidence to take on statistical analyses.

Dr. Campbell, you always had the right type of support for each situation. For recognizing when I needed a good laugh or when I needed technical support, I am deeply grateful. You helped me to recognize the meaning and fun in the process.

Dr. Baker, your expertise is matched by your kind and generous personality. Thank you for not only being a mentor but also a friend throughout the years.

Dr. Tashman, you always found a way to spark my curiosity and guide my passion in new and interesting directions. Over the years you have provided continued support and guidance and I am deeply grateful. You are not only a mentor but an inspiration.

A special thanks to Dr. Steele, who took the ultimate leap of faith in offering me an assistantship during my doctoral pursuit. You gave me the opportunity to dedicate myself to my studies without a financial burden. More importantly, you provided countless

opportunities for me to stretch my comfort zone and develop meaningful initiatives with student athletes. Your guidance and support kept me moving forward when I couldn't myself. You will always hold a special place in my heart.

Thank you to all of my peers who kept me accountable and motivated to strive for excellence. Lastly, a sincere thank you to all of the student athletes who trusted in my guidance and support over the years. You each gave me purpose and kept my passion alive.

Dedication

This work is dedicated to my family.

Dustin, you are my rock. You kept the process in perspective, held me to a standard of excellence, and listened to my countless venting sessions without judgement. I'm so thankful that you choose me every day.

Jake, Emma, and Chris- you three give me more inspiration than I could ever imagine. I hope that you see what's possible with a little dedication and a lot of support. You are my world.

Mom and Dad, I'd be nowhere without you. Thank you for believing in me, supporting me and most importantly loving me.

La famiglia è tutto.

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Manuscript 1: Antecedents and Consequences of Mental Readiness to Return to Duty Following Injury: A Qualitative Inquiry

Since 2008, injuries among the U.S. military were reported not only as the leading source of morbidity and mortality but also the preeminent health problem facing our military forces (Jones, Canham-Chervak, Canada, Mitchener, & Moore, 2010). Moreover, the Armed Forces Health Surveillance Center (2009) reported three times as many service members (SMs) received medical care for injuries *(N* = 599,299) than any other medical condition category. The Armed Forces Epidemiological Board (AFEB) reported that the health and readiness of the U.S. military personnel is more affected by injuries during peacetime or conflict than any other medical issue (Jones & Hansen, 2000). To put this into perspective, at that time there were 1,331,874 active duty SMs (Department of Defense, 2008), meaning that the estimated annual injury rate was approximately 45% (Bedno, Hauret, Loringer, Kao, Mallon & Jones, 2014). In a similar report of Marine Corps recruits, Kaufman, Brodine and Shaffer (2000) reported an estimated 6-12% of male recruits were injured during basic training *per month*. Furthermore, injuries are not only reported as the primary source of peacetime military disability discharge (Army Medical Surveillance Activity, 2003), but they are also associated with high attrition risk throughout basic training (Jones, Amoroso, Canham, Weyandt, & Schmitt, 1999) and extensive days of lost work (i.e., limited duty; Lauder, Baker, Smith & Lincoln, 2000; Potter, Gardner, Deuster, Jenkins, McKee, & Jones, 2002; Reynolds, White, Knapik, Witt, & Amoroso, 1999). Booth-Kewley, Larson and Highfill-McRoy (2009) suggested that both of these factors are detrimental to the U.S. Armed Forces in terms of military readiness and fiscal spending.

Cohen, Brown, Kurihara, Plunkett, Nguyen and Strassels (2010) have shown a "linear increase over time in the wounded-in-action to killed-in-action ratio of SMs who

have been injured in combat" since 2008. Litz (2006) further described the modern combat era, spanning three war efforts, as "the longest sustained U.S. combat operations since the Vietnam War, placing SMs at an increased risk for being wounded". Such findings have "led to an increased emphasis on rehabilitation" (Cohen et al., 2010) and have resulted in "several attempts to improve injury rehabilitation programs" (Booth-Kewley, Larson, & Highfill-McRoy, 2009). The Army Medical Department (AMEDD) emphasizes a central focus on the health and readiness of soldiers to deploy utilizing the soldier care concept (Jennings, Loan, Heiner, Hemman, & Swanson, 2005). In Jennings and colleagues (2008) investigation into soldiers' experiences of an expedited injury rehabilitation program to RTD, the researchers were "startled to discover the amount of physical and psychological pain and suffering expressed". The findings further suggested that injured SMs expect more support and need everyone involved to understand the dynamics that hinder healing. Furthermore, identifying injury risk factors has been the primary focus for most injury related efforts (Jennings, et al., 2008), ultimately addressing a part of the problem and therefore creating a gap in the rehabilitation resources offered to injured SMs.

This missing mental rehabilitation component could result in potential disparities for returning SMs. Clover and Wall (2010) noted that in sport, athletes traditionally return to sport from an injury once they demonstrate sufficient ability to pass sport-specific physical tests. Despite this historical practice, recent evidence suggests that physical and psychological readiness to return to sport may not be synonymous (Podlog & Eklund, 2006; Wadey & Evans, 2011). Further evidence demonstrates the profound psychosocial impact injuries can have on competitive athletes (Brewer 2007), including a reduction in self-esteem, loss of identity, depression, anxiety (Walker, 2006), and feelings of isolation

(Leddy, Lambert & Ogles, 1994; Petitpas & Danish, 1995). Arvinen-Barrow and Walker (2013) argue that a greater understanding of the injury affects treatment compliance, which can, in turn, affect coping skills and injury recovery (Arvinen-Barrow, 2009; Hemmings & Povey, 2002). It is further argued that although the potential to recover to pre-injury performance and fitness levels is possible for most injured athletes (Arvinen-Barrow & Walker, 2013), numerous fail to achieve this because of psychological factors (Tayler & Taylor, 1997), ultimately prompting researchers and practitioners alike to argue for holistic injury recovery resources (Bauman, 2005; Crossman, 1997). As McRae-Bergeron, May, Foulks, Sisk, Chamings, and Clark (1999) so poignantly point out,

> Just as readiness implies more than having the proper equipment to act instantly, military medical readiness signifies both physical and mental preparedness and implies an acute linkage to health or state of well-being.

Despite the few investigations into psychological readiness to return to competition following an injury, it is evident that there is a lack of clarity regarding the construct. This is made even more true when considering the population of injured SMs by the studies that primarily focus on physical readiness to RTD. In order to address the dearth of research into the role of mental readiness for returning SMs, a qualitative inquiry into the construct as it relates to SMs seems warranted. Furthermore, an in-depth understanding of the antecedents as well as consequences of mental readiness to return to duty could yield information to bridge the gap currently found in military rehabilitation programs and ultimately enhance progress for injured SMs' RTD. Considering the evidence suggesting injured athletes' well-being, rehabilitation progress, and return to competition are impacted by psychological variables (Wiese-Bjornstal, Smith, Shaffer & Morrey, 1998), the purpose of this study was

to operationalize mental readiness to RTD following injury rehabilitation and identify corresponding antecedents and consequences.

Method

Philosophical Orientation and Methodology

The primary research objective was to explore the meaning of mental readiness to RTD for injured SMs using a qualitative methodology. In order to establish methodological coherence in this investigation, examination of the researcher's philosophical orientation was carried out. The researcher's philosophical beliefs included epistemological (i.e., pragmatism) and ontological (i.e., contextualism) beliefs. Pragmatism reflects the epistemological stance that when regarding certain phenomena, 'fact' is founded in multiple outlooks and restricted in the established consensus of a particular period (Harry, Sturges, & Klinger, 2005; Mills, Chapman, Bonner, & Francis, 2007; Strauss & Corbin, 1990). Contextualism reflects the ontological position that the findings of the phenomenon are constructed by inter-subjective understandings (Strauss & Corbin, 1990).

Given the philosophical beliefs of the researcher and the utility-driven connections to subsequent studies using quantitative methodologies, Grounded Theory (GT) was chosen as the methodological approach for this investigation. Following Holt and Tamminen's (2010) suggestion, GT was also chosen because the existing theories related to mental readiness to return from injury have not been developed with this particular population (i.e., military), rather sport psychology studies have focused solely on injured athletes. Furthermore, Straussian grounded theory methodology, which adopts a constructivist approach to GT, was congruent with the researcher's epistemological and ontological viewpoint, therefore ensuring methodological coherence.

It was also vital to address the researcher's history, experiences, and existing theoretical knowledge related to this investigation. The researcher entered this investigation with prior knowledge of injured SMs' experiences and theoretical knowledge of psychological rehabilitation from injury. This knowledge influenced the thoughts, beliefs and positionality of the researcher in the initial development of the investigation. Adopting a Straussian GT approach allowed for the researcher to initiate the investigation with an initial research question in mind. Glaser and Strauss (1971) suggest that Straussian GT findings should not simply confirm preconceived notions, rather the data should generate a theory. The interaction between data collection and analysis throughout the study (i.e., the iterative process) allowed the data to drive the theory development. Further methodological protocols (i.e., 9 characteristics of GT studies) were followed in order to ensure that this investigation was not biased by the researchers' background and will be discussed in the following sections.

Theoretical sensitivity is a characteristic of GT, which is dependent on the type of GT methodology chosen. Given that this investigation is Straussian in nature, theory did, in fact, inform the conceptual context and research questions of this investigation. Maxwell (1996) pointed out that conceptual context is a representation of the theories upon which the qualitative investigation is based. Ultimately, few studies have attempted to identify and explain constructs of mental readiness to RTD following an injury, and therefore theories were not tested in this investigation. Instead, relevant theories were used to provide conceptual context in an attempt to initiate new insights into mental readiness to RTD. The sport psychology theories/models that influenced the conceptual context of this investigation included; (a) Stress-Injury Model, Anderson & Williams, 1988, (b) Grief-Loss and Stage

Models of Injury Rehabilitation, Kubler-Ross, 1969, (c) Biospychosocial Model of Injury Rehabilitation, Andersen, 2001, (d) Integrated Model of Psychological Response to Sport Injury and Rehabilitation, Wiese-Bjornstal, Smith, Shaffer & Morrey, 1998, (e) Return to Sport Model, Taylor & Taylor, 1997, (f) Self Determination Theory, Ryan & Deci, 2000, (g) and Psychological Readiness to Return to Competition, Podlog & Eklund, 2015. However, the conceptualization of this investigation was primarily influenced by Podlog & Eklund's (2015) investigation into injured athletes' psychological readiness to return and Ryan & Deci's (2000) self-determination theory as they are the most relevant to the researcher's background experiences with injured SMs. The researcher also intended to utilize the information gathered to inform a psychometrically sound instrument to measure MR to RTD, which will ultimately be utilized by practitioners to develop cognitive interventions to compliment physical rehabilitation prescribed to injured SMs.

Participants

Strauss and Corbin (1998, pp. 73) identified theoretical sampling (a characteristic of GT) as "sampling on the basis of emerging concepts". The theoretical sampling strategy was addressed by recruiting the research population with purposive sampling based on criteria selected *a priori*. Typically in GT, purposive sampling is not suggested in order to protect the iterative process. However, in this case it was used in conjunction with the funnel strategy in order to embrace the iterative approach. Consistent with the principles of theoretical sampling used in GT, the data collected initially focused on broad experiences of the participants and then focused in on key participants, events, and concepts identified during the analysis. This process also included sampling new people and settings in order to advance theoretical saturation.

Given that the intent of the study was to identify the meaning of mental readiness to RTD, participants were included if they met three criteria, which included; (a) current or previous membership in the U.S. Armed Forces, (b) sustainment of an injury while serving in the U.S. Armed Forces, and (c) loss of at least 1 day of duty because of the injury.

The total sample consisted of ten service members (e.g., Air Force, Army, Coast Guard, Marines, and Navy) who experienced an injury during service, which is depicted in Table 1.1. The sample consisted of two females and eight males. Of these participants, three identified as Veterans, three identified as Active Duty and four identified as ROTC cadets. The sample represented two Army, one Marine, one Air Force and six Navy SMs. Two of the SMs categorized their injury as moderate, while the rest (N = 8) categorized their injury as severe. Eight of the SMs were currently rehabilitating their injury while two had completed their injury rehabilitation within the past year.

Participants were recruited through several major sampling strategies. The first major strategy was ResearchMatch, an online database that connects researchers with willing research participants. The following major strategies utilized convenience samples. Previous colleagues who are working in military settings were contacted to disperse research and contact information to potential participants. Potential SM participants who serve as instructors were recruited from local university ROTC organizations. Lastly, online social media membership pages were targeted for recruitment.

Data Collection and Procedures

A GT approach was utilized to integrate research participants' views into the conceptualization of mental readiness for RTD, including: specifying its causes, conditions, and consequences. Following Podlog and colleagues (2015) qualitative design with athletic

populations, the intricacies of mental readiness was examined through participant perceptions gathered using two primary strategies, including: focus groups and one-on-one interviews.

Focus groups were utilized to identify a deeper understanding of mental readiness. The focus groups were asked to identify their injury and rehabilitation experiences through a semi-structured interview (see Appendix C). Based on Podlog and colleagues' (2015) design, the focus group was also prompted to explain how they would recognize whether or not they were mentally ready to resume pre-injury levels of required duty and how they believe mental readiness can be cultivated or developed. Additional inquiries into the possible consequences of returning to duty mentally ready was further analyzed in the follow-up individual interviews. As the analysis of data between focus groups provided deeper insight, subsequent probes were utilized to explore a deeper meaning of mental readiness (MR) through the participants' experiences and beliefs. This design was supported by previous research that suggested shared experiences in focus groups enable refinement of ideas (Palmer, Larkin, Visser, & Fadden, 2010; Wilkinson, 2003) and facilitated personal disclosure more than individual interviews (Wilkinson, 2003).

Another key characteristic of GT is the examination of experiences over time through multiple stages of data collection (Charmaz, 2000; Strauss & Corbin, 1990, 1998). In order to address this characteristic, this research design also included follow up one-on-one interviews with research participants. The objective of the one-on-one interviews was to refine the abstract nature of MR in conjunction with the details provided from the focus groups. Therefore, the intent of the collected data was to complement the data obtained from the focus groups. Additionally, participants were afforded the opportunity to discuss, share,

refine, and/or correct any thoughts provided during the focus group in order to sharpen the understanding of MR to RTD following injury rehabilitation. This investigation was designed as such in order to enhance the likelihood of achieving theoretical saturation.

Data from the focus groups were transcribed in order to conduct data coding for the initial hierarchical content analysis. The follow up interviews were also transcribed allowing for the secondary hierarchical content analysis. Following the synthesis of the qualitative data collection, descriptive components of MR were derived from the qualitative data and were provided to the participants. In order to test trustworthiness of the data collected, the participants were provided the descriptive components derived from the qualitative data and given the opportunity to refute, refine, or accept each component as a descriptor of MR to RTD. A frequency analysis was conducted and combined with the qualitative data in order to complete the final hierarchical content analysis. Throughout this process, constant comparison of data, theories and concepts were analyzed for similarities and differences in order to classify the data until saturation was met. A flow-chart of data-collection and analysis procedures is shown in Figure 1.1.

Data Analysis

Sparkes and Smith (2009) deem hierarchical content analysis as the most popular procedure for interpreting qualitative data in sport and exercise psychology. Therefore, this procedure was utilized to analyze the content provided by the participants in the focus group and one-on-one interviews. The transcriptions derived from the focus groups and one-on-one interviews were read and analyzed individually three times and then collectively two times in an effort to address the iterative process of GT. Thus, the transcriptions not only

provided clear depictions of the participants' experiences but also informed the follow up focus groups and one-on-one interviews.

Through a categorization process, termed coding, segments of data depicting relevance to the research question were coded. Initially, open coding was used until they were modified into set codes based on constant comparisons of instances found in the transcriptions and the results from the frequency analysis. Once the codes were compared and modified, the researcher organized them into first-order or sub-themes. The raw data that encompassed larger, more inclusive groups called second-order or higher-order themes were then identified. The themes were reviewed through the creation of a visual board encompassing cut out copies of the data encompassing each theme. Each theme was analyzed by the researcher and a fellow sport psychology expert in consideration of whether or not they were supported by the data for triangulation purposes. Additionally, the themes were provided to the participants in order to follow the practice of member checking. Participants were instructed to remove, add, and/or adjust any of the themes provided. The participants were also instructed to rank the themes in order of their relevance to building MR to RTD. In this process, multiple themes were modified and collapsed into 5 themes that were then defined by the researcher using the data.

In order to take the raw data from descriptive and raise it to a conceptual level, questions, comparisons and interpretations were made amongst the data. Questioning the data provided clarity of content and concepts and varied in nature; for instance, sample questions asked were 'Which concepts are well developed and which are not?' and 'Why is this significant?' Constant comparison of the data provided further interview questions and the evolvement of the data from descriptive to abstract. The participants' use of language

and emotions expressed were also analyzed and interpreted. Ultimately, this procedure allowed for a clearer depiction of MR to RTD.

Results

The intent of this investigation was to qualitatively understand the meaning and descriptive components of mental readiness to RTD. A GT approach provided an opportunity to understand the nuances and complexities of this concept through the lived experiences of participants who had been injured and were preparing or have returned to duty. Data collected from the focus groups and followup one-on-one interviews yielded five dimensions of mental readiness to RTD, including; (a) Overcoming Fear, (b) Confidence, (c) Motivation, (d) Mission Focus, and (e) Social Support. The hierarchical content analysis displayed subdimensions that accompanied each general dimension, advancing the explanation of the construct (Figure 1.2). The five dimensions were then examined in greater detail.

Overcoming Fear

Surmounting previous fears was one of the general dimensions synthesized from participant interviews. Fears appeared to manifest in the form of boundaries, both mental and physical in nature. SMs felt mentally prepared once they had tested these boundaries, ultimately replacing the fear with a sense of assurance. This dimension was composed of four sub-dimensions, including; (a) surpass mental and physical boundaries, (b) perform without hesitation, (c) certainty in ability, and (d) acceptance.

Overcoming fears was described as a process of recognizing incremental growth, which allowed for the surpassing of mental and physical boundaries. Alpha commented on how testing boundaries allowed him to overcome fears and become mentally ready:

> I don't think you're going to know unless you test it yourself. I think for me… I'm going to have to get out there and do what I'm afraid of doing and see if it's still bothering me, and if not, I'm good to go, and if it does still bother me, than I'm not ready. I don't know of another way I personally would know if I was mentally capable of getting back unless I could test it.

Having the opportunity to establish a greater understanding of ones' capabilities through trials seems to have an impact on whether an individual feels mentally ready to RTD. Mental readiness was also characterized by overcoming the fear of hesitating when it really mattered. Alpha commented, "I think that's a big part of it…getting past questioning if you're able to do what you were doing before." Performing without hesitation was a sure-tell sign for the participants that they were mentally prepared to RTD. A certainty in ones' ability to RTD further supported levels of mental readiness; A sentiment that Golf further reiterated, "being mentally ready is you've figured out you own way to conquer your fear…to the point you're no longer limiting yourself or over compensating." The last component of this dimension is acceptance. Acceptance of the injury and the process of returning to duty improved overall mental readiness for participants. India supported this by stating,

> You're aware of the injury…you're aware that it's there and aware that there's pain but you're not afraid of it. You're not letting it affect you emotionally and with your overall tasks. You know…there's pain but you're not stressed about it and not letting it take over your whole life.

Confidence

The confidence dimension represented the belief in one's ability to return to duty and fulfill their role and missions. This dimension encompasses three subdimensions, including; (a) trust, (b) knowledge, and (c) reflection.

SMs were confident to RTD when they were able to trust their body's capabilities and their own perceptions of their abilities to perform without hesitation or fear. SMs

experienced mental readiness when they no longer questioned if their body was prepared to return. Foxtrot mentioned:

> If you're able to progress to the point…where you're doing mission training and you feel like…your mindset is shifting from the injury to what you have to do then, then I think that's what's the goal.

Reflecting on incremental improvement also supported confidence to RTD by providing feedback on progress established over time. Golf mentioned:

> Documenting a lot of small successes and small wins along your rehab process, and once you start to get down about the losses, because I swear there's a lot more losses and you get knocked down a lot more along the way, you have to remind yourself to go back to the wins and log the wins.

Golf also mentioned the importance of "trust[ing] that it's going to be a very slow process." Confidence to RTD was further supported by knowledge and understanding of the injury and rehabilitation processes. Perhaps more importantly for garnering confidence, understanding the proper procedures to avoid re-injury was emphasized. India said:

> Knowing that I was mentally ready was knowing how to prevent the injury in the future. Having that knowledge, I was able to understand that 'hey I have these injuries, but I'm able to take care of my body the right way'. Having the confidence to apply those skills to strengthen even though I may still have some pain, but you know that with time it'll go away.

Motivation

SMs described MR to RTD as a state of motivation to return, which encompassed two subcomponents, including; (a) motivation to get back in the fight, and (b) motivation to breach limits.

MR to RTD was supported by high levels of motivation to contribute and participate in missions. Bravo mentioned, "When you're motivated to get back into it that's when I think that you know that you are ready." Charlie also mentioned, "I could just imagine if a

person is mentally prepared and they've been fully cleared, then they're just going to be like they were fresh out of boot camp, ready to go and fired up."

MR was also supported by high levels of motivation to surpass previous mental and physical limits in order to return. Bravo mentioned:

> I was motivated to prove to myself I could be better than I even was before…I really put it into my mind like 'hey I can overcome anything and nothing else is standing in my way, it's just me'. Before I wasn't as motivated, I was just going through the motions. Once I got injured it was like a huge step back, and I thought 'I just did all this work to get here and now I'm way down here'. Once you work yourself back up to this point you're like why not go further. So you build upon what you're baseline was before, and I think that's a huge part of the injury. It just makes you more motivated to be better than you were before.

Mission Focus

Mission focus was described as the ability to put the mission at the forefront of one's thoughts and behaviors and perform duties without hesitation or splitting attention between the mission and the injured body part. Three subdimensions were identified, including; (a) Focus is on role in missions leaving no hesitation because of focus on injury, (b) Recognition of when focus no longer makes them a liability to the unit/mission, and (c) Identity is restored and is no longer defined or dictated by the injury.

Focusing on the mission rather than on the injury or possible re-injury was a large component of MR. Foxtrot explained:

> To be mentally prepared, you're focused on the mission and you know whether or not you're ready for that. No one else will…Ultimately it comes down to the person, I think that if they're focused on that injury or re-injury or re-activation then they're not going to be mentally prepared.

It also was very important to consider the role of MR in terms of negatively impacting mission and/or unit success. Echo commented:

> If you can't focus on what you're doing, and it's easy to favor the leg and say you're okay and lie about it, but depending on what you're doing you should put the people you're going to go with in front of yourself. If you're the weak link, don't go make the situation worse for everybody else and just be open and honest about it with yourself. So you know you're not mentally ready if you feel like you might be the liability in returning to duty. Mental readiness could be evaluated like we ORM Operational Risk Management. Every time we went on a mission we would stack the risks and figure out whether or not all recent events accumulate to being worth it. So if you can pass the ORM in my mind that would be like okay kind of a check point like okay I'm still in the game, and if you can't pass it with an honest assessment, than you should probably go rehab some more.

Identity restoration was discussed as a component of becoming mentally prepared to RTD. Bravo described this process as:

> They don't realize the emotional trauma it causes for a person, especially if they've never had an injury before. Being taken out of everything that they've worked for really sucks. You have to dig deep down inside yourself and find your own mental strength I guess. So I think it builds your mental strength and your identity because you never have been challenged to this point mentally.

Support

Social support was depicted as a general dimension of MR and encompassed five subdimensions, including; (a) Recognition from important others that x-rays and MRIs don't measure MR, (b) Unit has your back during recovery and upon return, (c) Chain of command has your back, (d) SMs feel as if they are not just a number to the medical staff, and (e) Maintained (altered) involvement in unit operations during rehabilitation.

Having important individuals in the rehabilitation process recognize that MR is not measured the same way that physical readiness is became a consistent theme among the participants. Golf explained:

> Even if it is possible to be 100% mentally ready to return to full duty, the Army would never give you enough recovery time to reach that point. The only thing that matters is when your physical profile expires. Those profiles

> only reflect what an Xray/MRI shows you. And if a doctor doesn't see anything wrong, then you are expected to perform at 100% mentally and physically.

Having the support of the unit played a vital role in the development of MR. Alpha mentioned:

> I was really lucky. I had a lot of people reach out and check up on me and I think it helped with feeling too alone…having people reach out did help a lot. There's just so much they can do. My peers is what meant the most to me. So it did mean the most when they did reach out.

Equally as important, support from the Chain of Command contributed to the development of MR. Delta mentioned, "It is important for the Chain of Command to be there for support." Bravo also explained:

> I feel like the command could do better at being more interested in a person that's injured because they don't realize the emotional trauma it causes for a person, especially if they're never had an injury before and being taken out of everything that they've worked for…really sucks.

Participants identified the dramatic impact that the medical staff can have on MR to RTD. Juliette explained, "Mental health professionals are an important part of the assessment. It is important to have [them] engaged with the RTD goal of its Soldiers." Hotel also mentioned "Just talking to medical staff and being able to talk about what's going on and everything I think that'd be the greatest help." India further explained,

> It is important to understand that service members want to believe they can trust their military care providers and not feel like they are just a number. Treating a patient with minimal effort will affect the service members' confidence to be mentally ready.

Lastly, participants described the impact of remaining involved with their unit for the development of MR. Juliette explained:

> I think the mental readiness of injured SMs would be greatly improved while injured, if they still maintained some level of a group setting with their original unit. This is because often times you are isolated once you are injured so it leads to further problems.

Antecedents and Consequences of Mental Readiness

Precursors to MR were identified by the participants as mindsets, documentation of small successes, and mission specific practice/tests. It was commonly discussed that a SM's mindset acted as a precursor to the development or impairment of mental readiness. According to Echo:

> It's all through a mindset. A mindset of seeing…I hurt my shoulder. Great. Now I can take my shoulder and throw it in a sling, and I'm going to get stronger on my left arm…and just keep moving and…accomplishing the next evolution…It's just a long path with a positive mindset and discipline really.

Participants also consistently identified the need to document small successes in order to build mental readiness, therefore supporting it as an important antecedent. Echo also explained:

> Small victories are great in my mind…it's like a mindset shift. You have to look at it like the injury is an obstacle and opportunity to grow and come back stronger. Through adversity you will be better. You may not know exactly when, where or how, but you know that you're working on the slow long path towards that no matter how incremental it is. It's simple in theory but very difficult daily to execute.

Additionally, having opportunities to test physical and mental capabilities in settings that mimicked missions rather than arbitrary physical performance standards was identified by the participants as a precursor to building MR. When asked how to develop MR, Delta explained:

> Taking small steps to incrementally see your improvement…using controlled simulation where you can…be in a similar situation to see how you…react and whether or not you're in the right place thinking and your ability to do things.

Consequences of MR emerged as avoidance, identity changes, re-injury, and impacts on performance. Avoidance was explained as a consequence for a lack of MR upon returning to duty. Alpha mentioned:

> If you're not mentally ready, whether it's subconsciously…you might reason out of it…you might come up with other reasons. You might start to negatively think about returning to duty and…that might deter you from returning if you have the option. Subconsciously you might want to avoid it if not outright.

Changes in identity surfaced as another potential consequence of returning to duty. Golf explained:

> For me, I think you've got to take recovery of your identity into play because when you do get injured…it's not a complete loss of identity, but for a lot of us there is a loss of identity associated with your injury. Whether you're somebody that's getting a 300+ PT score and now you're a person that only can score a 200 PT score because of limitations from profile because you can't do an event. Or you're used to being the person that leads the formation runs and now you're not able to do that because of injury. Or if you're the person that normally does all the stuff for an FTX, and you're the PL that everybody knows will be super 'hooah' running out to the field now you can't do that. There's definitely that loss of identity because you're used to being that person that leads people, and as you are in this post-rehab/post-recovery getting re-acclimated to being back in your duty position…as you're finding your way…recovering your identity again is going to play a big role in whether or not you're successful with your mental and physical recovery.

An additional consequence that MR has on returning to duty is the potential for re-injury. Foxtrot described this consequence further:

> You're going to hold yourself back a lot and possibly even re-injure yourself. Trying to prevent the things from happening you're probably going to stop strengthening as much as you probably should…then when you're expected to perform full duties then that's going to re-injure whatever it is that you had. Personally it's probably more dangerous to return to active duty immediately after being cleared by passing a couple of tests if you're not mentally prepared.

The final consequence associated with mental readiness to RTD is performance impacts. Delta explained:

> I think if you return when you're not mentally ready to return, it can have a long term impact on your performances. Because if you wait until you are mentally ready to come back, there's probably less of a transition and you can probably more quickly get back to where you were in your performance according to your job. If you come back too soon and you're not quite mentally ready, you're probably not going to perform well at first and that's

> going to affect your mental readiness again because you'll be seeing yourself not perform well and that's just going to hurt your confidence and you moving forward and make it harder for you to improve than if you come back mentally ready.

The discernment of antecedents and consequences associated with MR to RTD is vital to providing a clearer picture towards building a theoretical understanding. Figure 1.3 provides a depiction of the explained relationships.

Discussion

The aim of this study was to develop a grounded theory explaining mental readiness to return to duty following an injury for SMs. This investigation makes a significant contribution by identifying five general dimensions of MR to RTD, including; (a) Overcoming Fear, (b) Confidence, (c) Motivation, (d) Mission Focus, and (e) Support.

Overcoming Fear

Returning from injury mentally prepared has been characterized as a dynamic psychosocial process (Podlog, Banham, Wadey & Hannon, 2015). Webster, Feller and Lambros (2008) identified fear, nervousness and tension as the most common emotions experienced upon return from a sport injury. Similarly, an investigation by Ross (2010) into ACL injuries among Air Force Academy cadets showed a correlation between higher levels of fear and lower outcome measures. These emotions were also described by the participants of this study. Overcoming fears became a marker of MR. In sport research, Heil (2000) reported that heightened negative emotions nearing the end of rehabilitation, efforts to delay rehabilitation, and hesitation in drills and tests of capabilities are common indicators of fear. Further research by Carey and colleagues (2006) showed that fears influenced attention causing hesitation and a level of uncertainty. Similarly, Podlog and Eklund (2009) demonstrated that athletes who were able to learn about their ability to overcome barriers

experienced higher levels of return to sport success. The participants from this investigation supported these notions by explaining the necessity to overcome fears by testing and surpassing boundaries in order to attain a level of certainty in their ability, acceptance of their situation and ultimately to perform without hesitation. These perceptions were all indications of SMs' MR to RTD.

Confidence

Confidence was shown to be a contributing factor to MR to RTD. SMs' built confidence through self-feedback and assurance from others. Reflection on the rehabilitation process allowed the injured SMs the opportunity to build trust in their capabilities, a central component of Bandura's (1986) social cognitive theory. Additionally, knowledge of the injury process and how to avoid re-injury in the future also played a vital role in the SMs' level of confidence. Similarly, Johnston and Carroll (2000), determined that injured athletes with greater sport experience demonstrated greater information needs. Arvinen-Barrow and Park (2013) further demonstrated this notion by identifying the need for technical and informational support in order for athletes to feel confident in their ability to return from injury.

Numerous studies in the sport realm support the necessity to develop a sense of confidence to return from injury (Bianco, 2001; Bianco, Malo & Orlick, 1999; Gordon & Lindgren, 1990; Gould, et al., 1997; Grove & Gordon, 1995; Johnston & Carroll, 1998; Podlog & Eklund, 2005; Taylor & Taylor, 1997; Wiese & Weiss, 1987). However, this investigation offers unique evidence to support confidence as a critical determining factor for injured SMs to return to duty successfully.

Motivation

Bates and colleagues (2008, p. 68) explain that reintegration into duty following injury, particularly for severe injuries, can reveal significant challenges. Although the decision to RTD relies heavily on a SMs ability to perform the original or alternate military specialties satisfactorily, the general view is that if a SM wants to RTD then measures should be taken to ensure their return. For this particular sample, the injuries sustained were not serious enough to warrant medical review for the SMs viability to maintain their position within the military. Therefore, it was important to consider the role of motivation on rehabilitation adherence as well as motivation to return.

Motivation to RTD was commonly discussed among the participants of the current investigation as a component of MR whereas motivation to adhere to rehabilitation was not. Perhaps this was a contribution of lower than civilian levels of autonomy or the SMs' organizational commitment. Organizational commitment in a military context is indicative of the realignment of personal beliefs, values, and goals to be consistent with those of the U.S. Armed Forces (Booth-Kewley, Larson, & Highfill-McRoy, 2009). Booth-Kewley and colleagues (2009) demonstrated the impact of organizational commitment on injured Marine recruits' attrition rates, suggesting that SMs who establish a strong sense of organizational commitment may exhibit greater motivation and determination to push through setbacks like injuries.

In addition, sport psychology literature suggests that the end of injury rehabilitation is composed of demonstrating strength and proprioceptive gains as well as the inclusion of specific agility drills and movements (Hamson-Utley, 2010; Kamphoff, Thomae, & Hamson-Utley,). It is logical to assume that the reintroduction of such movements that were

previously inhibited and/or allow a sense of identity to be restored could be highly motivating for the recovering SM. This notion was echoed throughout the participants' testimonies and demonstrated the importance of SMs motivation to RTD when considering MR to RTD.

Mission Focus

Hesitation can have catastrophic effects on mission effectiveness, and therefore is a primary concern for achieving operational readiness (Fletcher & Wind, 2014). Morrison and Fletcher (2002) defined cognitive readiness as 'the mental preparation (including skills, knowledge, abilities, motivations, and personal dispositions) an individual needs to establish and sustain competent performance in the complex and unpredictable environment of modern military operations.' Cognitive readiness encompasses both tacit knowledge (i.e., knowledge built from experience) and recognition-primed decision-making. Injured SMs have likely experienced a considerable amount of training to develop cognitive readiness and therefore likely understand the personal requirements to handle a mission effectively. This notion was echoed across every participant in this study, justifying the recognition of one's abilities to have a mission focus and recognize when that focus is jeopardized.

Support

Support was the final general dimension derived from this investigation. Many support concerns surfaced that had commonalities with sport research (Brewer, 2007; Podlog & Eklund, 2007; Udry, Gould, Brindges, & Tuffey, 1997; Wiese,-Bjornstal, Smith, Shaffer, & Morrey, 1998). Participants in this investigation commonly spoke of a lack of support from their chain of command and medical staff. The experience of social dislocation was also very common, leaving an impact on the SMs. Also, an overall lack of knowledge

and guidance regarding injury, rehabilitation, and career future, was commonly discussed as means of deteriorating MR. Udry and colleagues' (1997) study depicted a similar experience for athletes. Interestingly, there was little, if any, mention of family and/or spousal support and their effects on MR to RTD, even though family and spousal support often receives ample attention in both literature and the applied setting across the U.S. Armed Forces (Bates, Bowles, Kilgore, & Solursh, 2008).

Limitations and Future Research Directions

Consistent with previous research, this investigation is not without its limitations. The participant sample is likely to be the greatest limitation. A more homogenous sample could have provided a clearer depiction of this phenomena, particularly a sample that included combat-related injuries and special operations forces (SOF) personnel. Future research should identify a sample that consists of injured SMs who are at the same stage in their recovery and who experienced the same injury in order to understand the differences of MR to RTD across injury type. Considering that musculoskeletal injuries are the most common injury amongst SMs this would be an ideal beginning point. Furthermore, separating samples based on combat-related injuries or training-related injuries could further provide unique insight.

Finally, this investigation should be considered a preliminary investigation. Deeper inquiry into the state of MR to RTD, its precursors and consequences should also integrate physical readiness measures in order to develop a theoretical framework to determine whether injured SMs are 'fit for duty'. This framework should be compared to existing models in the military and sport environment (i.e., Theory of sport injury-related growth, Roy-Davis, Wadey & Evans; Post Traumatic Growth, Calhoun & Tedeschi, 1999) in order

to examine convergence and develop satisfactory understanding of rehabilitation experiences. In doing so, an inclusive and theoretically-sound examination can provide unlimited opportunities for sport psychology practitioners to deliver appropriate and targeted rehabilitation interventions for injured members of the U.S. Armed Forces that are aimed at preserving mission readiness and warfighter well-being.

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Table 1.1. *Participant Demographics and Diagnosis*

Sex	Branch	Component	Enlisted/Commissioned	Injury
F	Navy	ROTC		Stress fracture
F	Army	Active Duty	C	ACL tear
M	Navy	ROTC		Wrist injury
M	Navy	ROTC		Ankle injury
M	Navy	ROTC		Knee injury
M	Navy	Veteran	E	Shoulder dislocation
M	Navy	Veteran	E	Herniated disc
M	Army	Veteran	E	Shoulder tear
M	Air Force	Active Duty	E	Herniated disc
M	Marine	Active Duty	E	Herniated disc

Note. Abbreviations: F = female; M = male; C = Commissioned; E = Enlisted.

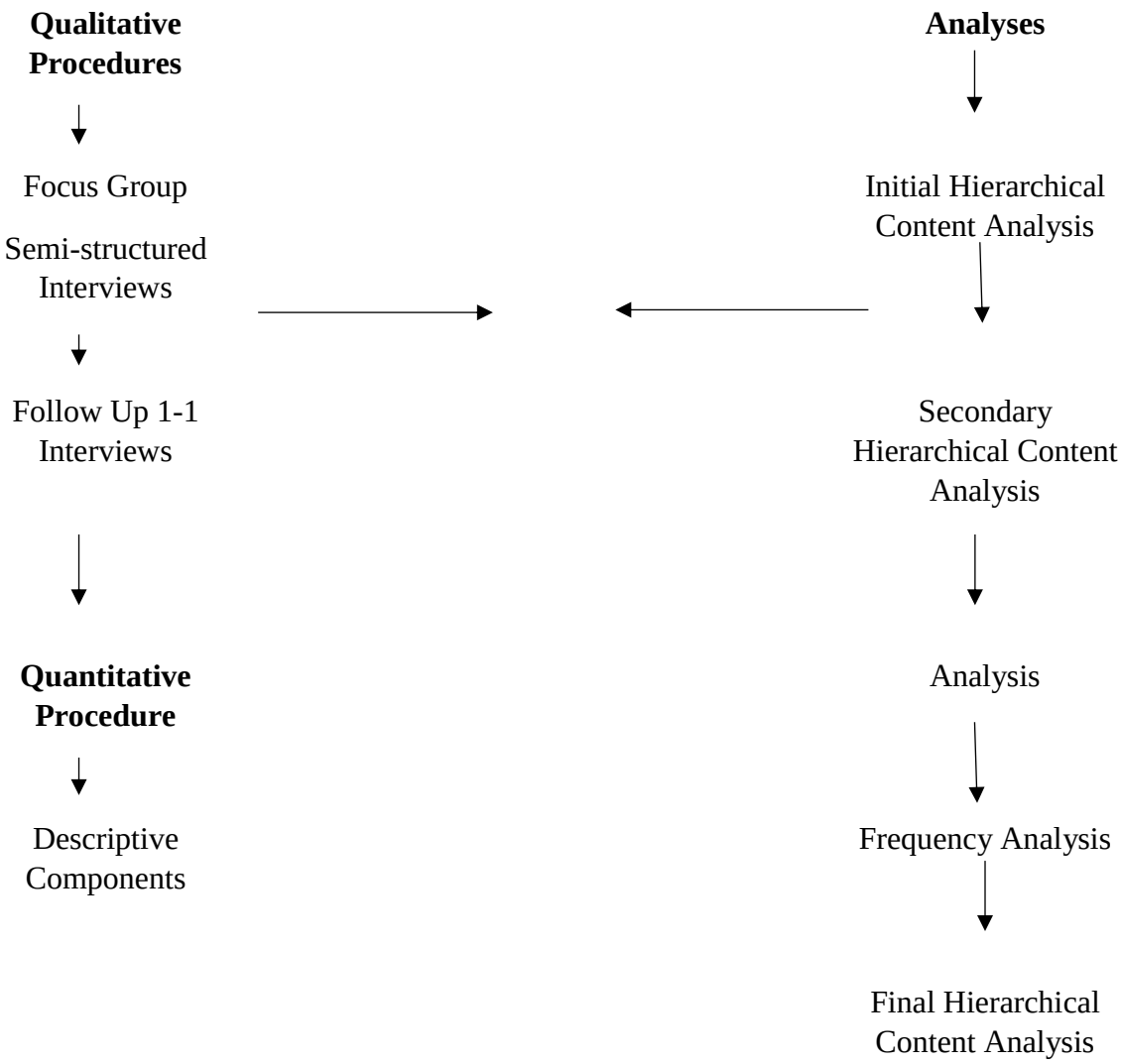

Figure 1.1. Flow Chart of Data Collection and Analyses.

General Dimensions	Sub-Dimensions
Overcoming Fear →	Surpass boundaries Perform without hesitation Certainty in ability Acceptance
Confidence →	Trust Knowledge Reflection
Motivation →	Get back in the fight Breach limits
Mission Focus →	Focus on role in missions not injury Recognition of liability to unit/mission Identity is restored
Support →	Recognition from others that medical equipment doesn't measure MR Unit support Chain of command support Medical staff support Maintained involvement

Figure 1.2. General Dimensions and Sub-Dimensions.

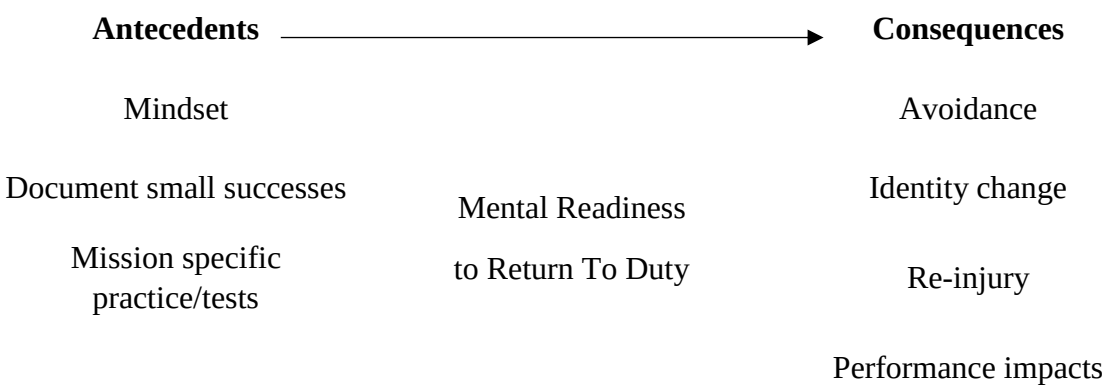

Figure 1.3. Antecedents and Consequences of Mental Readiness to Return to Duty.

Manuscript 2: Development and Preliminary Factorial Validity of the Military Mental Readiness to Return from Injury Instrument (MMRRII)

Operational readiness is a pivotal component of the U.S. Armed Forces' ability to optimally perform strategic efforts and missions. Morrison and Fletcher (2002) described operational or military readiness as unit readiness, which measures units' physical, tactical, and cognitive training (i.e., amongst other components, including: equipment) in an effort to elicit and maintain peak performance across broad situational demands. A critical component of operational readiness is military physical training (PT), which has ultimately resulted in high occurrences of injuries sustained by service members (SMs), both in theatre and in garrison (Kaufman, Brodine, & Shaffer, 2000). Kaufman et al. (2000) reported declines in military readiness as a result of complications due to injuries, including: time loss, patient morbidity, attrition rates, and training costs. In fact, the Armed Forces Health Surveillance Branch (2017) reported that between February 2016 and January 2017, a total of 1,308,586 injuries were reported across all branches of the U.S. Armed Forces, demonstrating a significant obstacle to maintaining operational readiness. Due to the importance of military readiness and the amount of injuries sustained, maintaining MR has elicited numerous investigations into injury epidemiology (Jones, Cowan, Tomlinson, Robinson, Polly & Frykman, 1993; Kaufman, Brodine & Shaffer, 2000; Knapik, Ang, Reynolds & Jones, 1993; Reinker & Ozburne, 1979; Riddell, 1990), injury risk factors/prevention (Bell, Mangione, Hemenway, Amoroso, & Jones, 2000; Jones, Bovee, Harris & Cowan, 1993; Jones, Bovee & Knapik, 1992; Reynolds, Heckel, Witt et al., 1994; Tomlinson, Lednar & Jackson, 1987), and injury interventions (Almeida, Williams, Shaffer, Luz, Badong & Brodine, 1997; Amoroso, Ryan, Bickley, Leitschuh, Taylor & Jones, 1998).

However, these investigations are missing a vital component; the psychology of injury and rehabilitation for SMs.

Bernton (2011) highlighted the necessity of high physical demands for military service and readiness such as carrying more than 100 pounds of gear and equipment during training and deployment. In addition to high physical requirements, extreme climatic and geographical conditions (e.g., hot and cold regions, mountainous terrain) generally contribute to a high rate of injury amongst SMs (Thelen, Koppenhaver, Hoppes, Shutt, Musen, Davidson, & Williams, 2015). Because military service requires prolonged physical fitness and athletic ability (e.g., endurance and strength) over SMs' careers, Hearn, Rhon, Goss and Thelen (2017) propose that injuries present a significant challenge to MR.

Typically, injured SMs return to duty once they are deemed 'fit for military duty' by medical professionals. To be 'fit for duty', Barrow, Sheean and Burns (2017) emphasized that one must be able to function at a physical level high enough to perform all job-specific duties as well as pass military fitness requirements. However, a recent investigation by Podlog, Banham, Wadey and Hannon (2015) in the sport domain offered preliminary evidence to support a previously-investigated notion that physical and mental readiness to return from injury do not coincide nor are they synonymous (Crossman, 1997; Ford & Gordon, 1998; Podlog & Eklund, 2006; Wadey & Evans, 2011). This distinction is important because returning SMs to duty too early from an injury may threaten Warfighter proficiency and thereby the safety and effectiveness of the unit and their mission (Radomski, Weightman, Davidson, Finkelstein, Goldman, McCulloch…& Stern, 2013). Thelen and colleagues (2015) suggest this lack of clarity is confounded by the lack of objective tools developed for determining if someone is ready to RTD. Additionally, the Armed Forces

Health Surveillance Branch (2017) reported that of the SMs injured in 2017, 61% returned to duty with no limitations. This high rate suggests the need to formulate an understanding of what it means for these returning SMs to be mentally 'fit for duty' to ensure safety and effectiveness upon return. Therefore, the purpose of this study was to provide clarity into the determinants of MR to RTD following rehabilitation of an injury through the development of a psychometrically-sound MR instrument, which is a critical part of this process.

Prevalence and Epidemiology of Injuries amongst U.S. Armed Forces

Injuries amongst SMs typically either occur in combat or non-combat settings. Most combat injuries are blast related and therefore tend to be more severe, whereas most non-combat related injuries occur in training situations or recreational incidents. Therefore, combat and non-combat injuries are discussed separately.

Combat Injuries

Belmont, Schoenfeld and Goodman (2010) reported that the U.S. Armed Forces have been involved in the largest scale armed conflict since the Vietnam War, which has spanned three major war-efforts (i.e., Operation Iraqi Freedom (OIF); Operation Enduring Freedom (OEF); and Operation New Dawn (OND)). These war-efforts have seen a drastic shift in unconventional tactics used by enemy combatants, including: terrorism, insurgency, and guerrilla warfare (Belmont, Schoenfeld & Goodman, 2010). In OIF alone, the Department of Defense (2009) reported that 31,483 SMs were wounded in action (WIA). Additionally, Woodruff, Galarneau, Luu, Sack and Han (2014) identified approximately 50,000 SMs wounded in OEF/OIF combined.

Belmont and colleagues (2010) conducted an epidemiological report of combat wounds sustained in OIF and OEF, which demonstrated an increase in extremity injuries

caused by explosive mechanisms (i.e., improvised explosive devices, mortars, rocket-propelled grenades and landmines). Belmont's investigation (2010) further documented that explosions accounted for 81% of all combat-related injuries during OIF and OEF. Due to the advancements in protective measures (e.g., body armor and equipment), a larger proportion or injuries are reported in the extremities, including the head and neck regions. Ressler and Schoomaker (2014) credit unprecedented progress in medical advancements for an increased likelihood of survivability from combat wounds. However, these injuries are complex and often leave injured SMs with a lifetime of pain and disability. Even more important, the remarkable medical advancements have not yet been matched in mental or behavioral health progress, resulting in a significant need for improved prevention, treatment and intervention of the mental consequences of combat-related injuries (Ressler & Schoomaker, 2014). McGeary, McGeary and Blount (2016) suggest these changes in the nature of combat and medical treatment have resulted in unique trauma-related conditions (e.g., Posttraumatic Stress Disorder (PTSD), Traumatic Brain Injury (TBI), and extremity injuries) that are distinct and demand attention and resources. Taking this into consideration in conjunction with the recognition that injuries are a psychosocially dynamic experience (Podlog, Banham, Wadey & Hannon, 2015), researchers and practitioners are in a unique position to address the novelties and complexities of combat injuries.

Non-Combat Injuries: The Hidden Epidemic.

Former U.S. Army Surgeon General, James Peake, referred to nonbattle-related injuries as "the hidden epidemic" currently paralyzing military readiness (Cohen, Brown, Kurihara, Plunkett, Nguyen & Stassels, 2010). Hearn, Rhon, Goss and Thelen (2017) reported that musculoskeletal injuries sit among the most common of noncombat-related

injuries, accounting for 29% of ambulatory medical visits across the Army in 2014, with a cost of over $25 million. Furthermore, Cohen and colleagues (2010) reported that the primary cause of soldier attrition during wartime is the rate of disease and non-battle-related injuries. Similar reports have shown significantly higher rates of noncombat-related injuries amongst Marine Corps basic training recruits (Booth-Kewley and colleagues, 2009), Army basic training recruits (Jones, Bovee, Harris & Cowan, 1993; Knapik, Sharp, Canham-Chervak, Hauret, Patton & Jones, 2001; Knapik, Trone, Swedler, Villasenor, Schmied, Bullock & Jones, 2009), Army infantry One-Station Unit Trainees (OSUT; Jones, Cowan, Tomlinson, Robinson, Polly & Frykman, 1993), and Army military police One-Station Unit Trainees (MP OSUT; Knapik, Graham, Cobbs, Thompson, Steelman & Jones, 2013), further perpetuating the notion of a 'hidden epidemic'.

Self-Determination Theory in Injury Rehabilitation

Numerous theoretical models have been proposed for the conceptualization of athletic injury risk, rehabilitation and return to sport (e.g., Stress-Injury Model, Anderson & Williams, 1988; Grief-Loss and Stage Models of Injury Rehabilitation, Kubler-Ross, 1969; Biospychosocial Model of Injury Rehabilitation, Andersen, 2001; Integrated Model of Psychological Response to Sport Injury and Rehabilitation, Wiese-Bjornstal, Smith, Shaffer & Morrey, 1998; and the Return to Sport Model, Taylor & Taylor, 1997). Each model has demonstrated strengths and limitations. However, a consensus on a theoretical framework that focuses entirely on the mental aspects of returning from injury has yet to be identified. In light of this lack of consensus, Podlog and Eklund (2007) offer compelling rationales for the adoption of self-determination theory (Ryan & Deci, 2000) as the foundational

framework for conceptualizing a mental readiness to return from injury model and an instrument to measure it..

Ryan and Deci (2000) proposed self-determination theory (SDT) to illuminate a continuum of motivational states that drive actions and behaviors. They further contended motivational states are a reflection of satisfaction or deprivation of three innate psychological needs (i.e., competence, autonomy, and relatedness). Ryan and Deci (2000) further assert that all three needs are essential and that detrimental impacts on wellness will occur if any of these three needs are unsupported or thwarted. Podlog and Eklund's (2007) literature review revealed that injured athletes frequently experience concerns and/or difficulties in their return to sport in terms of continuing to meet the three basic needs proposed by Ryan and Deci (2000). Therefore, SDT as it relates to return from an injury was further explored focusing on the three basic motivation needs that must be met.

Competence Needs

Competency generally refers to an ability to complete something successfully and/or efficiently. Bedno and colleagues (2014) reported that compared to civilians, SMs more often work in hazardous conditions, including; weapons and explosives use, carrying heavy loads, operating heavy machinery and deployment worldwide with short notice. These conditions require precise performance, thus making competency of duties and capabilities critical (Nindl, et al., 2015). It is also necessary that SMs develop competency to conduct strenuous military operations in order to avoid injuries, which negatively impact personal and unit readiness (Bedno et al., 2014). Interestingly, Bedno and colleagues (2014) also reported that SMs who had deployed for more than 30 consecutive days in the past 24

months were associated with lower odds of non-combat injuries, suggesting that the most physically ready and resilient soldiers are deployed.

Booth-Kewley and colleagues (2009) reported low self-efficacy to be one of the determinants of basic training attrition among injured Marines. It is logical to consider that competency plays a role in injury and re-injury risk, a notion with potential benefit for the U.S. Armed Forces. Furthermore, as rehabilitation becomes a priority of the military, former U.S. Army Surgeon General, James Peak (2010) suggested that the control of associated pain (post-injury rehabilitation) is vital to reserve unit readiness. Therefore, establishing competency in controlling pain and prevention of re-injury act as necessities.

Competency-related concerns/needs of sport injury rehabilitation have been identified to include: lack of confidence, fear of re-injury, anxiety about the consequences of returning to sport, and fear regarding the ability to return to pre-injury levels (for a review see Podlog & Eklund, 2007). Podlog and Eklund (2007) further argued that these concerns provide the necessary justification for employing SDT as a theoretical framework for understanding the MR to return from an injury.

Autonomy Needs

Autonomy generally refers to an internal locus of control and/or freedom from external control. SMs are indoctrinated with a Warfighter ETHOS upon completion of basic training. This process creates different levels of organizational commitment, which is a realignment of personal beliefs, values, and goals to be consistent with that of the U.S. Armed Forces (Booth- Kewley, Larson, & Highfill-McRoy, 2009). This process is a necessary component of operational readiness and has been a determining factor for attrition rates post injury (Booth- Kewley, Larson, & Highfill-McRoy, 2009; Cohen, Brown,

Kurihara, Plunkett, Nguyen, & Strassels, 2010). The complexities this notion develops in terms of autonomy are likely vast and underreported. However, due to medical and technological advancements, SMs are regaining capabilities allowing them to continue military operations (Kratzer, 2006). In addition, if an injured SM wants to RTD, it is generally believed that they should be provided the support to do so (Bates, Bowles, Kilgore, & Solursh, 2008).

Empirical research in sport psychology has shown that autonomy to return to sport following injury can be impacted by external pressures (Crossman, 1997; Taylor, 1985; Williams & Roepke, 1993), profound desires to return to sport (Crossman, 1997; Samples, 1987), and internalization of the 'sport ethic' and/or cultural norms/beliefs about sport participation (Curry & Strauss, 1994; Frey, 1991; Hughes & Coakley, 1991; Messner, 1992; Nixon, 1994). Further empirical investigations support the notion that autonomy levels are instrumental in return to sport outcomes (Bianco, 2001; Bianco, Malo, & Orlick, 1999; Gould, Udry, Bridges, & Beck, 1997; Podlog & Eklund, 2005). More specifically, higher levels of autonomy were associated with positive psychological outcomes (Podlog & Eklund, 2005), whereas lower levels of autonomy were associated with negative psychological outcomes (e.g., increased anxiety and tension; inability to focus on appropriate and relevant tasks/cues).

Relatedness Needs

Relatedness generally refers to a connection built through social support systems (e.g., teammates, coaches, family, friends, and medical staff). Depending on the injury type and severity, certain resources are put in place to ensure that injured SMs are not experiencing isolation. However, this is not always true. Isolation, pain, disrupted sleep,

complications, change in identity (i.e., soldier to patient), slow recovery, depression, anxiety, financial instability, family difficulties, and overall uncertainty are all potential forms of stress that injured SMs encounter during their rehabilitation (Bates, et al., 2008). It is logical to conclude that these stressors can be both daunting and overwhelming, particularly if the injured SM is carrying the burden alone. Therefore, the ability to connect with others could be a necessity for successful injury rehabilitation.

Injured athletes commonly experience feelings of alienation and isolation during injury recovery and upon return to sport (Bianco & Eklund, 2001; Ermler & Thomas, 1990). Social support has been shown to be a potential preventative measure combatting such feelings (Andersen, 2001; Bianco & Eklund, 2001), which often times result in a premature return to sport (Bianco, 2001). In addition to easing feelings of isolation, social support has also been shown to help injured athletes better understand the rehabilitation process, set realistic expectations, ease fears, recognize improvements, and build confidence (Bianco, 2001; Johnston & Carroll, 1998).

Dimensions of Mental Readiness

Scant research has investigated the meaning of MR to RTD following an injury. This absence of research is even more prevalent in the military literature. However, Podlog and colleagues' (2015) recent qualitative investigation yielded three dimensions of mental readiness to return from athletic injury. Podlog and colleagues' (2015) investigation into psychological readiness to return to competition yielded three dimensions: (a) confidence in returning to sport, (b) realistic expectations of one's (sporting) capabilities, and (c) motivation to regain previous performance standards. Podlog and colleagues' (2015)

research suggests these dimensions appear to enhance athletes' perception of a successful return from injury.

Although their investigation has demonstrated novel insight into this MR phenomenon, to date, no other studies have examined mental readiness to return to duty following injury. This investigation utilized both qualitative and quantitative means to derive dimensions of military MR to RTD, including; (a) Overcoming Fear, (b) Confidence, (c) Motivation, (d) Mission Focus, and (e) Support. Therefore, results derived from Manuscript 1 of this investigation and the three dimensions identified by Podlog and colleagues' study provided the conceptual framework for developing key dimensions for a MR instrument for the military.

Competence-Related Dimensions

Competence related dimensions included confidence, overcoming fears, mission focus and realistic expectations of capabilities. These dimensions were derived from separate military and sport-related investigations.

Confidence. The confidence dimension was recognized by both studies. Podlog and colleagues (2015) identified confidence as the primary component of mental readiness following injury. Like mental readiness, confidence was multidimensional and consisted of three higher-order themes, including: (a) a belief in the efficacy of one's rehabilitation program, (b) a belief that one's formerly injured body part was fully healed, and (c) efficacy in one's post-injury performance capabilities. Athletes reported the necessity for progress in rehabilitation, a knowledgeable sport medicine staff, and access to good rehabilitation facilities in order to find efficacy in their rehabilitation program. Furthermore, athletes

highlighted minimal fear of re-injury as an important component in the efficacy of rehabilitation success for the injured body part.

The confidence dimension recognized in Manuscript 1 also consisted of three higher order themes, including; (a) trust, (b) knowledge, and (c) reflection. Participants determined that their levels of MR to RTD were impacted by their overall confidence. Confidence encompassed trust in their body's capabilities, which was developed through reflection and feedback on progress. Additionally, SMs felt more confident to RTD when they were armed with knowledge and understanding of the injury and rehabilitation process as well as how to avoid possible re-injury.

Overcome fear. SMs in Manuscript 1 identified overcoming fears as a primary component of MR to RTD. This dimension is composed of four sub-dimensions, including; (a) surpass mental and physical boundaries, (b) perform without hesitation, (c) certainty in ability, and (d) acceptance. Fears were described as physical and mental boundaries that SMs needed to surmount in order to overcome and build mental readiness. SMs also feared hesitating during missions upon return, which indicated a barrier needed to be overcome in order to be mentally prepared. Additionally, SMs knew they had overcome their fears when they believed that they were capable of performing once they returned to duty. Acceptance of the injury situation also allowed SMs to move past fears associated with the injury.

Mission focus. Injured SMs explained the importance of having a mission focus in order to determine MR to RTD. This dimension encompassed three subdimensions, including; (a) Focus is on role in the mission, leaving no hesitation because of focus on injury, (b) Recognition of when focus no longer makes them a liability to the unit/mission, and (c) Identity is restored and is no longer defined or dictated by the injury. It was imperative to

the SMs that they were able to not only focus on the mission rather than their injury but to also recognize when they were unable to focus in order to put the mission and safety of their units first. Additionally, when SMs were able to attain a mission focus, they also felt the restoration of their identities, which played a large role in MR to RTD.

Realistic expectations of one's capabilities. The realistic expectation dimension from Podlog and colleagues' (2015) study encompassed three subcomponents: (a) realizing that you've been injured, (b) putting in 'building' blocks, and (c) being aware that you're not going to be as good as you were pre-injury. Patience, acceptance, and effective goal setting were reported antecedents of this dimension. Nixon (1992) and Curry (1993) contend that the normalization of injury and pain is an internalized cultural belief amongst athletes. They further argue that this internalized conceptual mental framework often results in a premature return from injury that compromises physical and psychological well-being and long-term health.

This notion is similarly echoed by SMs who are expected to embody specific ethos set forth by each branch (e.g., Army- loyalty, duty, respect, selfless service, honor, integrity, and personal courage). Porter (2012) contends that "generally, soldiers believe that anything short of model physical fitness and unyielding mental toughness is somehow indicative of weakness, and perhaps even flawed character" (p. 30). As a result, injuries and mental difficulties are viewed as a weakness and accompanied with specific stigmas, potentially thwarting the ability to formulate realistic expectations of one's capabilities following an injury.

Autonomy-Related Dimensions

The autonomy-related dimensions encompassed motivation to regain previous performance levels and overall motivation.

Motivation to regain previous performance levels. Podlog and colleagues' (2015) investigation further reported that athletes recognized the necessity for a 'sufficient level' of motivation in order to regain previous performance capabilities. Although not specified, a 'sufficient level' of motivation to return was deemed a contributing dimension of mental readiness to RTD. Upon experiencing an injury, the 'invincible warrior' has to face the reality of being vulnerable and no longer invincible. This realization coupled with a loss of physical ability can be psychologically devastating; potentially prompting injured SMs to invoke a variety of intrinsic and extrinsic motivators to RTD (Porter, 2012). Podlog and Eklund (2007) further suggested that the type of motivation driving injured athletes to return to sport could have "important ramifications regarding the psychological outcome of that return." Thelan and colleagues (2015) reported the disclosure of SMs' willingness to return to duty and perceived or actual pressure from supervisors to return to prior levels of activity right away as examples of the intrinsic and extrinsic factors that affected their rehabilitation. Thelan et al.'s (2015) findings suggest that this third dimension reported by Podlog and colleagues (2015) could be a determining factor promoting successful RTD, particularly if intrinsic motivators are established and promoted throughout rehabilitation.

Motivation. Injured SMs in Manuscript 1 discussed the role of motivation on MR to RTD, yielding motivation as a general dimension that included two subdimensions: (a) motivation to get back in the fight, and (b) motivation to breach limits. The desire to 'get back in the fight' and re-join the cause seemed to have a drastic impact on MR.

Additionally, the eagerness to surpass previous and current limits was significantly embedded in MR levels.

Relatedness-Associated Dimensions

The only dimension associated with relatedness was social support. This dimension was prevalent in both the military and sport contexts.

Social support. Manuscript 1 identified social support as a component of MR that encompassed five subdimensions, including; (a) Recognition from important others that x-rays and MRIs don't measure MR, (b) Unit has your back during recovery and upon return, (c) Chain of command has your back, (d) Feel as if they are not just a number to the medical staff, and (e) Maintained (altered) involvement in unit operations during rehabilitation.

Social support can come in many forms (e.g., medical staff, co-workers, family members, etc.) and has clearly been shown to directly affect injury outcomes (Williams & Andersen, 1998). Currently, resources are dedicated to preparing SMs' social support system (e.g., family) for the return of deployed SMs (i.e., Family Readiness Groups). However, when SMs are injured and/or medically evacuated while deployed, the family often does not receive this education and preparation. The lack of preparation can also be confounded by difficult circumstances during the reunion with the SM. This is particularly true when injured SMs experience life-altering and/or life-threatening injuries requiring them to rely more heavily on their family members. Mateczun and Homes (1996) suggests this new reliance often times prompts SMs to feel like a burden on their family, which can have an adverse effect on their rehabilitation. However, Porter (2012) proposed that family members have the ability to positively impact SMs' rehabilitation progress. Park (2011) found that military families not only model great resilience and strength amidst challenges,

but they are also capable of providing the necessary support and feedback needed for injured SMs to successfully return to duty. Therefore, it is proposed that social support will be identified as a major dimension of MRRTD.

Measurement of Mental Readiness

Rotella and Heyman (1986) cautioned that "the future will demand that injury rehabilitation include both physical and psychological components." These sentiments were echoed a decade later by Quinn and Fallon (1999) who felt that uncovering the unclear psychological processes of injury recovery was "crucial to the ultimate goal of recovery and return to competition." In 2015, Podlog and colleagues examined the process of mental readiness to return to sport and identified a tentative conceptual framework to begin to examine this important concept. However, despite the urgency placed on a rehabilitation process that encompasses both physical and mental components by researchers and practitioners alike, there is yet to be an agreed upon screening tool that measures SMs' MR to RTD. Thus, a quick review of related RTD following rehabilitation instruments was undertaken as part of the instrument development process.

Upon examination of the current instruments used for injury rehabilitation that incorporate a focus on psychological factors, no military-specific instruments were found. Therefore, sport-specific instruments were analyzed and used as models for the development of items for the Military Mental Readiness to Return from Injury Instrument (MMRRII). These instruments included; (a) Injury-Psychological Readiness to Return to Sport Scale (I-PRRS; Glazer, 2009), (b) Re-Injury Anxiety Inventory (RIAI; Walker, Thatcher & Lavallee, 2010), (c) Causes of Re-Injury Worry Questionnaire (CR-IWQ; Christakou, Zervas, Stavrou & Psychountaki, 2011), (d) Return to Sport after Serious Injury Questionnaire (RSSIQ;

Podlog & Eklund, 2005), and (e) Athletic Fear Avoidance Questionnaire (AFAQ; Dover & Amar, 2014).

Although the I-PRRS is conceptually limited (Podlog and colleagues, 2015), the unidimensional focus on confidence to return to sport influenced the item development for the confidence subscale of the MMRRII. Similarly, the RIAI, CR-IWQ, RSSIQ, and AFAQ were unidimensional in nature and primarily focused on the anxieties and/or fears of returning to sport following an injury. Therefore, these instruments influenced the item development for the appraisal of risk and realistic expectation subscales of the MMRRII.

Screening Tools for Return to Duty Decisions

Several screening tools (e.g., Musculoskeletal Readiness Screening Tool, Hearn, Rhon, Goss, &Thelen, 2017; Return to Duty Screening Tool, Thelen, Koppenhaver, Hoppes, Shutt, Musen, Davidson & Williams, 2015; and Assessment of Military Multi-Tasking Performance, Radomski, Weightman, Davidson, Finkelstein, Goldman, McCulloch, Toy, Scherer & Stern, 2013) have been put forth to measure an injured SMs' ability to RTD. However, these tools place emphasis primarily on the individuals' level of physical readiness to RTD. Even more concerning, Thelen and colleagues (2015) reported that military clinicians "lack a screening tool that is simple yet thorough, inexpensive, and can be readily performed with minimal training," suggesting that even these tools used for physical readiness are less than ideal for demonstrating a clear understanding of SMs' overall (i.e., physical and mental) fitness for duty following an injury.

Item Development and Refinement

Data collected from Manuscript 1 was analyzed for relevant themes to be incorporated in the development of a self-report instrument designed to measure mental

readiness to RTD as well as refine existing dimensions to best capture MR. This instrument was developed across two distinct studies, using the following procedure; (a) Formulate new scale items and modify items from existing instruments, particularly Podlog and colleagues' Sport Mental Readiness Model, (b) Revise this initial item pool based on feedback from a panel of experts, (c) Examine content validity of the instrument and refine the item pool through exploratory factor analysis (EFA), and (d) Utilize exploratory structural covariance modeling to refine the instrument further to ensure strong fit indices.

Study 1: Development and Refinement of Initial Item Pool

The primary purpose of Study 1 was to construct an instrument (i.e., MMRRII) designed to measure mental readiness to return to duty following injury rehabilitation for a military population. The secondary purpose was to examine the factor structure and the internal consistency of the MMRRII.

Participants. The sample consisted of 166 service members (i.e. current and/or previous) who have sustained an injury while serving in the U.S. Armed Forces. The participant sample (N = 166) consisted of 105 (63%) males, 43 (26%) females and 3 (2%) that did not wish to answer. The sample was predominantly Army (45%, N = 75), Active Duty (81%, N =134) Caucasian (72%, N = 120), married (53%, N = 88) and had completed a bachelor's degree or higher (55%, N = 92). When categorizing their injury severity, the sample consisted of 45% (N = 74) moderate injuries, 27% (N = 45) traumatic injuries, 13% (N = 22) severe injuries, and 6% (N = 10) minor injuries. The majority of the injuries were non-combat related (68%, N = 113). Further descriptive statistics can be found in Tables 2.1, 2.2, and 2.3.

The criteria for participant inclusion in the study required: (a) an injury sustained while serving in the U.S. Armed Forces, (b) SM sought medical attention for the injury, and (c) altered duty requirements occurred (i.e., permanent or temporary) as a result of the injury. Participants were recruited from (a) an online research database (i.e., ResearchMatch), (b) personal contacts, (c) nearby University ROTC detachments and Veterans Affairs facilities, and (d) social media groups.

Instrumentation. Participants completed the initial item pool of the MMRRII-Version A finalized from Manuscript 1 that included five dimensions and 6 items representing the 18 subdimensions (see Figure 2.1). The five dimensions included, (a) Overcome fear (N = 8, four subdimensions, N = 2), (b) Confidence (N = 6, three subdimensions, N = 2), (c) Motivation (N = 6, three subdimensions, N = 2), (d) Mission Focus (N = 6, three subdimensions, N = 2), (e) Support (N = 10, five subdimensions, N =2). This instrument also included the Injury Mental Readiness Demographics Instrument, which assessed age, gender, military experience (i.e., branch, enlisted/commissioned, job), number of months since the last injury, type, place, and duration of injury, duration of rehabilitation program, outcome of injury, and the experience of sustaining an injury (i.e., combat, non-combat).

Data Analysis Plan

The content validity of the initial version of the instrument was assessed by a 3-member expert panel familiar with sport psychology and injury rehabilitation issues. The panel was instructed to familiarize themselves with the construct being measured. An initial version of the instrument was provided to panel members, and they were instructed to rate the degree to which the content of each item matched the hypothesized construct it was

written to measure. Items were rated on a five-point Likert scale ranging from 1 (low content validity) to 5 (excellent content validity). The panel was also prompted to provide written/oral evaluations for items and the instrument as a whole, including possible rewording. Three types of data informed further instrument refinement, including: (a) descriptive statistics for the item content-relevance ratings provided by the panel, (b) ANOVA and post hoc analyses to determine differences between the panel members, and (c) separate values of the statistical significance of Aiken's item content validity coefficient to assess panel ratings.

Following the preliminary instrument development, data was collected from the sample population using a Qualtrics survey designed to collect data online. All data was examined for missing data and cases, using *a priori* criteria established by Tabachnick and Fidell (2012) for excluding participants from the subsequent analyses. Of the 192 cases, 26 were removed for substantial missing data, leaving a total of 166 cases. The target population was of utmost importance, so data was then analyzed to ensure that each case met the inclusion criteria previously established. Descriptive statistics and Mahalanobis distances were used to identify outliers (i.e., univariate and multivariate) in the data. Then, skewedness and kurtosis of the data was examined to assess whether the assumption of normality was satisfied.

Following data cleaning, the factor structure of the instrument was examined through exploratory factor analysis (EFA), using the Statistical Package for Social Science (SPSS-Version 23). Maximum likelihood (ML) extraction and direct oblimin rotation were utilized in order to examine hypotheses about the underlying factor structure (Tabachnik & Fidell, 1996). Any factor with an eigenvalue greater than or equal to one was retained. A stepwise

process was used to enhance the factor structure by eliminating items one at a time that (a) did not show a loading of ≥ .40 on any factor, (b) load simultaneously with multiple factors at ≥ .30, and/or (c) had no conceptual relevance to the factor as a whole. Finally, internal consistency was assessed by calculating Cronbach's alpha internal consistency values for each viable factor, along with means and standard deviations of subscale scores and correlations between factors (see Table 2.6). Subscales with Cronbach's alpha values greater than 0.70 were retained (Tabachnick & Fidell, 1996). The reported statistics informed the refinement of the item pool for the next version of the instrument.

Results

Exploratory Factor Analysis (EFA) was utilized to examine the factor structure of the instrument using SPSS-Version 23. Using the Maximum likelihood (ML) extraction method and direct oblimin rotation, a three-factor structure emerged. Fit statistics are reported in Tables 2.6. Based on item content, the factors were named Social Support (Factor 1), Competence (Factor 2), and Autonomy (Factor 3).This three-factor structure of the MMRRII-Form B consisted of three 4–item dimensions that accounted for 75% of the total variance. Internal consistency of the factors were analyzed using Cronbach alpha internal consistency reliability to determine the internal consistency of each dimension. The three factors' alpha coefficients were acceptable; demonstrating values of .90, .91, and .83 respectively.

Discussion

The intent of this study was twofold; (a) to develop a measure of MR to RTD and (b) to test the instrument for factorial validity and parsimony. The MMRRII was developed from previous studies in the sport and military realm. The instrument was refined through

feedback on face validity from an expert panel before dissemination to 166 participants. The instrument was tested using exploratory factor analysis and provided preliminary evidence to support the proposed factor structure.

The conceptual development of the MMRRII Form B was strongly supported by SDT theory and information gathered from Manuscript 1's qualitative investigation into the meaning of MR to RTD. Ryan and Deci's (2000) self-determination theory suggests that the level of one's feelings of self-determination is contingent on the degree to which three basic needs (i.e., autonomy, competence, and relatedness) are met. The presence of these conditions often results in optimal performance and well-being, whereas maladaptive responses are seen when conditions are thwarted. This theoretical framework provided conceptual continuity among the items written for this instrument. The items were derived from the original 5-dimensions suggested from Manuscript 1, and each dimension had subdimensions, which were addressed with at least two items.

Initially, the MMRRII hypothesized model consisted of 36 items, representing six subscales. Ultimately, three subscales with 12 items total were empirically derived. The original social support subscale held firm, after deleting six items. The removal of these items revealed the importance SMs place on their units and chain of command during their rehabilitation and return. Mission focus and overcoming fear were two original dimensions that ultimately combined to represent Competence. The items that remained encompassed notions of overcoming fears and hesitation in order to focus on performing, which described the level of proficiency needed for an injured SM to RTD. The last subscale, Autonomy was developed from the collapse of the original motivation, overcoming fear, and confidence dimensions. The language in each of the remaining items described the belief that when

mentally ready, returning from injury was an authentic choice. Upon the completion of the EFA, a conceptually and empirically sound instrument emerged for preliminary purposes, thus accomplishing the primary intent of this first study.

Study 2: Refine Initial Item Pool Utilizing Exploratory Structural Covariance Modeling

The purpose of this study was to utilize exploratory structural covariance modeling (ESCM) to further assess model fit as well as refine the item pool into final form. Because of the data collection challenges encountered, ESCM was used instead of confirmatory factor analysis (CFA) because enough additional data to have a new sample to confirm our EFA-derived factor structure and examine fit indices could not be obtained.

Participants

This study utilized the same data collected from Study 1.

Instrumentation

Form B of the MMRRII was utilized with the previously-collected data to identify fit criteria of the factor structure identified in Study 1 (see Table 2.4 for dimensions and items).

Data Analysis Plan

The items that were retained following EFA in Study 1 were utilized to examine model fit further using exploratory structural covariance modeling employing the statistical software package, Analysis of Moment Structure (AMOS; Arbuckle, 2011; Version 23). Unlike EFA, factor rotation was not employed in ESCM, so all indicator cross-loadings were set to zero. The model was first identified by fixing the latent variables. Then the number of freely estimated parameters were checked to ensure that they do not exceed the number of pieces of information in the input variance-covariance matrix (Brown, 2015).

Once statistical identification was reached, maximum likelihood (ML) estimation was utilized. This iterative procedure works towards a set of parameter estimates that are no longer able to be reduced, demonstrating goodness of fit and parsimony. Parameter estimates and model fit was estimated through a range of fit indices, including: (a) the maximum likelihood estimation (MLE), (b) likelihood ratio statistic (CMIN or chi-square statistic; (χ^2), (c) χ^2 / degrees of freedom ratio (CMIN/DF), (d) goodness of fit index (GFI), (e) Tucker-Lewis Index (TLI), (f) comparative fit indices (CFI), and (g) root mean square error of approximation (RMSEA). In order to assess goodness of fit, the following *a priori* target cutoff values were used: GFI ≥ .95 (Joreskog & Sorbom, 1993), CFI ≥ .95, TLI ≥ .95 (Hu & Bentler, 1999), and RMSEA ≤ .06 (Hu & Bentler, 1999). Following these analyses, a composite assessment determined retention of items in order to formulate an updated version of the instrument (i.e., MMRRII-Version C).

Results

To determine fit of the three-factor structure, ESCM was employing to examine model fit, using AMOS. Parsimony and interpretability of the model determined fit revisions. Initial fit was satisfactory (CFI = .93 ; χ^2 (51) = 141, p < .001; RMSEA = .10; see Figure 2.1 for standardized parameter estimates and model fit). Factor loading estimates demonstrated strong relationships between factors and indicators (range of R2s = .71- .90). Based on the modification indices, improvement to model fit was obtained by specifying a covariance between error terms separately for Items 1 and 3 of the support scale.

Respecification yielded model fit improvement for the structural covariance model (CFI = .95 ; χ^2 (50) = 119.04, p < .001; RMSEA = .09; see Figure 2.2 for standardized parameter estimates and new model fit). Factor loadings slightly improved, ranging from .71

to .94. Ultimately, this model was both parsimonious with good fit and conceptually sound, particularly considering the relative small size of the sample used for instrument development and refinement.

Discussion

Schutz and Gessaroli (1993) made a call to action for the field of sport and exercise psychology to use CFA and SEM to examine instrument model fit and provide a more accurate examination of antecedents and consequences of important mental constructs. Despite the somewhat slowly growing popularity of these statistical techniques, Marsh (2007) further argued that all new and existing measures be evaluated using CFA and SEM in order to document their psychometric properties. Moreover, Marsh (2007) advocates that because constructs in sport and exercise psychology are typically hypothetical, and thus subjectively assessed, construct validation is a necessary part of the preferred approach to instrument development. The demand for sport-specific instruments that provide solid construct validity evidence has been well established (Duda, 2001; Gauvin & Russell, 1993; Marsh, 2007), and it also applies to exercise, health and performance psychology. Therefore, the intent of this investigation was to offer greater insight into the potential measurement standards for this new instrument to measure mental readiness to RTD. Support for the psychometrics of the MMRRII Version C was preliminarily established through an exploratory investigation of the factor structure and fit of the new instrument.

The MMRRII model derived from EFA, was supported by ESCM, ultimately providing preliminary factorial support for the instrument. The 12-item instrument was tested with rigorous statistical methods in order to derive a psychometrically-sound and parsimonious model. The fit indices from the ESCM were indeed indicative of a good fitting

model. The 12-item, 3 subscale model was initially supported, primarily supporting the established inclusion criteria. However, after adding covariance error for two items that were similarly worded in the social support subscale, model fit improved.

This exploratory examination of the MMRRII revealed a psychometrically-sound 12-item, three subscale instrument. The three latent factors were empirically supported with unrestricted (EFA) and restricted (ESCM) measures. Model fit was both parsimonious and conceptually sound. Each item held a factor loading greater than .60 on their respective factors, demonstrating item relevance. Therefore, this investigation has provided preliminary evidence to support the MMRRII-C as a useful tool for measuring MR to RTD. However, readers are cautioned to be wary of these initial results. The downsizing from six to three dimensions of MR could be a less than accurate depiction of the construct. Particularly considering the high Cronbach alpha's, which could suggest redundancy amongst the dimensions. Therefore, the results from this investigation should be considered as preliminary.

Due to the low number of participants, there is a level of concern about the reliability associated with these results. Additionally, the lack of a second participant sample to run a confirmatory factor analysis (CFA) leaves a gap in empirical support. Future research should not only aim to address the sample size but should also work to ensure that the sample accurately represents the U.S. Armed Forces. The elimination of biases should be central to the data design and procurement in order to ensure generalizability of the results.

The model derived from this study does not include antecedents or consequences of MR to RTD. Therefore, a working model should be developed to examine antecedent and consequent correlates of the MMRRII using SEM. Lastly, future research should test this

instrument with a larger population using advanced statistical methods, such as CFA, invariance testing, and exploratory structural equation modeling (ESEM) in order to advance the breadth of knowledge and provide more accurate resources for our injured SMs.

Ultimately, this investigation provided a preliminary attempt to measure the construct of MR to RTD. Although these results should be read with caution, they are both intriguing and enlightening. MR to RTD should continue to be examined with rigor so that future interventions can be provided for examining the practical utility and construct validity of the mental readiness of injured SMs to return to duty following injury rehabilitation.

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Table 2.1. *Descriptive Statistics of Study 1 and 2 Participant Sample*

	N	%
Gender		
Male	105	63.3
Female	43	25.9
Other	3	1.8
Race		
African American	7	4.2
American Indian/ Alaska Native	3	1.8
Asian	1	.6
Latino, Spanish, Hispanic	8	4.8
Caucasian	120	72.3
Other	12	7.2
Marital Status		
Married	88	53
Widowed	7	4.2
Divorced	28	16.9

Table 2.1. *Continued*

	N	%
Marital Status		
Separated	5	3
Never Married	23	13.9
Education		
High school or GED	3	1.8
Some college	34	20.5
Associate degree	22	13.3
Bachelors degree	46	27.7
Masters degree or higher	46	27.7

Table 2.2. *Descriptive Statistics of Study 1 and 2 Participant Sample- Injury Specific*

	N	%
War		
OEF	25	16.4
OIF	30	19.7
OND	5	3.3
OIR	7	4.6
Other	85	55.9
Injury Severity		
Severe	22	13.3
Traumatic	45	27.1
Moderate	74	44.6
Minor	10	6
Recovery Time Frame		
> 1 month	36	21.7
1-6 months	42	25.3
6-12 months	19	11.4

Table 2.2. *Continued*

	N	%
12+ months	54	32.5
Type of Injury		
Combat	21	12.7
Non-combat	113	68.1
Both	18	10.8

Table 2.3. *Descriptive Statistics of Study 1 and 2 Participant Sample- Military Specific*

	N	%
Branch of Service		
Air Force	23	13.9
Army	75	45.2
Coast Guard	2	1.2
Marine	21	12.7
Navy	30	18.1
Military Component		
Active Duty	134	80.7
National Guard	7	4.2
Reserve	8	4.8
ROTC	2	1.2
Status Change*		
Yes	42	25.3
No	109	65.7

Table 2.3. *Continued*

	N	%
Current Status		
Active Duty, Full time	11	6.6
Active Duty, Part time	5	3
Separated	80	48.2
Retired	55	33.1

Note. Branch and Military Component reflect time of injury. * This reflects whether an individuals' status changed as a result of the injury.

Table 2.4. Original Dimension Labels for the 45-Item MMRRII

Dimension	Subscale	Item
Overcome Fear	OFA1	…I was the only person standing in my way of being mentally ready to return to duty.
	OFA2	…I had progressed enough physically to feel secure in my ability to return.
	OFA3	…I had surpassed limits (mental & physical) I was unsure I would reach.
	OFA4	…I had grown stronger through the adversity of the injury.
	OFB1	…I could perform my duties without limiting myself or over compensating.
	OFB2	…I had the ability to fulfill my duties without hesitation.
	OFB3	…I didn't think before I reacted.
	OFC1	…I found a way to conquer my fears of re-injury.
	OFC2	…I had faced my fears of re-injury and was no longer afraid.
	OFC3	…I was no longer aware of my fears of re-injury.
	OFD1	…I had accepted my injury as an obstacle but one that provided an opportunity to grow.

Table 2.4. C*ontinued*

Dimension	Indicator	Item
Overcome Fear	OFD2	…I had taken the small steps in my rehabilitation incrementally over time and felt comfortable to return.
Confidence	CA1	…I could trust my ability to perform my duties without worry.
	CA2	…I no longer questioned if my body was prepared to return.
	CA3	…Confident that I could return without holding myself back.
	CA4	…Confident that one small movement would not re-activate the injury.
	CB1	…Confident because I had more knowledge on how to keep myself healthy and avoid re-injury.
	CB2	…Confident because I understood the proper rehabilitation movements to promote healing and prevent future injury.
	CB3	…Confident in my ability to prevent future injury.
	CC1	…Confident because I had focused on all of the small wins in the rehabilitation process.
	CC2	…Confident that I could continue to attain small success in my return to duty.

Table 2.4. C*ontinued*

Dimension	Indicator	Item
Motivation	MA1	…Motivated to return in order to contribute to my unit.
	MA2	…Motivated to return to duty.
	MA3	…Motivated to return in order to participate in trainings and missions.
	MB1	…Motivated to come back stronger than before.
	MB2	…Motivated to push past fears and build mental toughness.
	MB3	…Motivated to prove to myself that I could be better than I ever was before.
	MC1	…Motivated to continue on the long slow path towards full healing.
	MC2	…Motivated to build my capabilities over time.
Mission Focus	MFA1	…I could focus solely on the mission and not on my injured body part.
	MFA2	…I could focus on performing my role in missions and not worry about re-injury.

Table 2.4 C*ontinued*

Dimension	Indicator	Item
Mission Focus	MFB1	…Capable of recognizing when my focus on re-injury would make me a liability to my unit and/or missions.
	MFB2	…I was no longer a liability to my unit in our missions/operations because I didn't focus on my injury or possible re-injury.
	MFC1	…My identity was restored.
	MFC2	…My identity was no longer defined or dictated by my injury.
Support	SA1	…That those important to me recognized that medical tests aren't the only measurement of my level of readiness to return to duty.
	SA2	…Supported in my mental recovery as much as my physical recovery.
	SB1	…My unit had my back during the recovery process.

Table 2.4. *Continued*

Dimension	Indicator	Item
Support	SB2	…My unit supported me upon my return to duty.
	SC2	…My chain of command supported me upon my return to duty.
	SD1	…My medical staff saw me as more than just a number.
	SD2	…Supported by the medical staff.
	SE1	…Maintaining social involvement with my unit supported my recovery.
	SE2	…Maintaining altered involvement in operations/missions/daily tasks supported my recovery.

Note. Stem = "When it came time to return to duty following my injury, my mental readiness improved because I felt…"

Table 2.5. Refined Dimension Labels for the 36-Item MMRRII

Dimension	Subscale	Item
Overcome Fear	OFA1	…I had surpassed limits (mental & physical) I was unsure I would reach.
	OFA2	…I had grown stronger through the adversity of the injury.
	OFB1	…I could perform my duties without limiting myself or over compensating.
	OFB2	…I had the ability to fulfill my duties without hesitation.
	OFC1	…I found a way to conquer my fears of re-injury.
	OFC2	…I had faced my fears of re-injury and was no longer afraid.
	OFD1	…I had accepted my injury as an obstacle but one that provided an opportunity to grow.
	OFD2	…I had taken the small steps in my rehabilitation incrementally over time and felt comfortable to return.
Confidence	CA1	…I no longer questioned if my body was prepared to return.
	CA2	…Confident that one small movement would not re-activate the injury.

Table 2.5. C*ontinued*

Dimension	Indicator	Item
Confidence	CB1	…Confident because I had more knowledge on how to keep myself healthy and avoid re-injury.
	CB2	…Confident because I understood the proper rehabilitation movements to promote healing and prevent future injury.
	CC1	…Confident because I had focused on all of the small wins in the rehabilitation process.
	CC2	…Confident that I could continue to attain small success in my return to duty.
Motivation	MA1	…Motivated to return in order to contribute to my unit.
	MA2	…Motivated to return in order to participate in trainings and missions.
	MB1	…Motivated to come back stronger than before.
	MB2	…Motivated to prove to myself that I could be better than I ever was before.
	MC1	…Motivated to continue on the long slow path towards full healing.

Table 2.5. C*ontinued*

Dimension	Indicator	Item
Motivation	MC2	…Motivated to build my capabilities over time.
Mission Focus	MFA1	…I could focus solely on the mission and not on my injured body part.
	MFA2	…I could focus on performing my role in missions and not worry about re-injury.
	MFB1	…Capable of recognizing when my focus on re-injury would make me a liability to my unit and/or missions.
Mission Focus	MFB2	…I was no longer a liability to my unit in our missions/operations because I didn't focus on my injury or possible re-injury.
	MFC1	…My identity was restored.
	MFC2	…My identity was no longer defined or dictated by my injury.
Support	SA1	…That those important to me recognized that medical tests aren't the only measurement of my level of readiness to return to duty.

Table 2.5. *Continued*

Dimension	Indicator	Item
Support	SA2	…Supported in my mental recovery as much as my physical recovery.
	SB1	…My unit had my back during the recovery process.
	SB2	…My unit supported me upon my return to duty.
	SC1	…My chain of command had my back during the recovery process.
	SC2	…My chain of command supported me upon my return to duty.
	SD1	…My medical staff saw me as more than just a number.
	SD2	…Supported by the medical staff.
	SE1	…Maintaining social involvement with my unit supported my recovery.

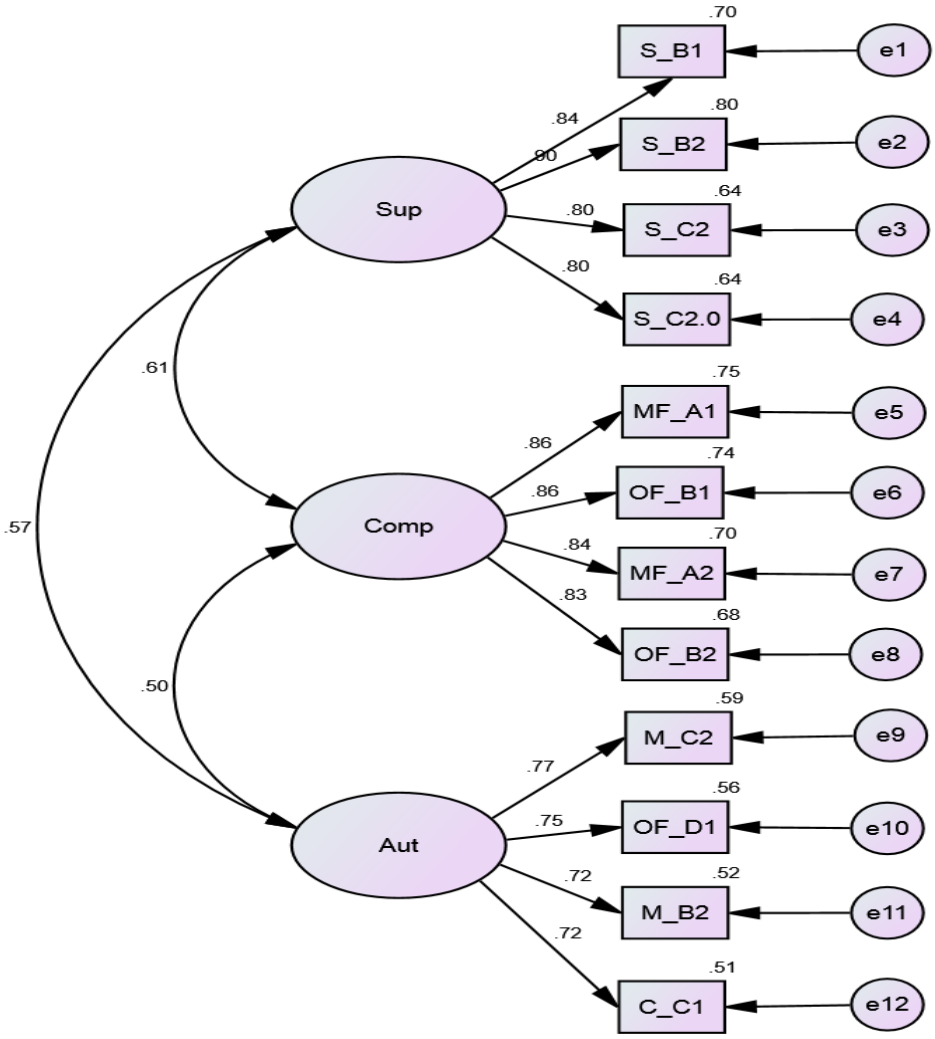
Table 2.6. *EFA Results for Version B of the MMRRII*

Item (Original Dimension Label)	**Support**	**Competence**	**Autonomy**
SB1…My unit had my back during the recovery process	.920		
SB2…My unit supported me upon my return to duty	.809		
SC1… My chain of command had my back during the recovery process	.770		
SC2… My chain of command supported my return to duty	.696		
MFA1…I could focus solely on the mission and not on my injured body part		-.910	
OFB1…I could perform my duties without limiting myself or over compensating		-.856	
MFA2…I could focus on performing my role in missions and not worry about re-injury		-.793	
OFB2…I had the ability to fulfill my duties without hesitation		-.670	

Table 2.6. *Continued*

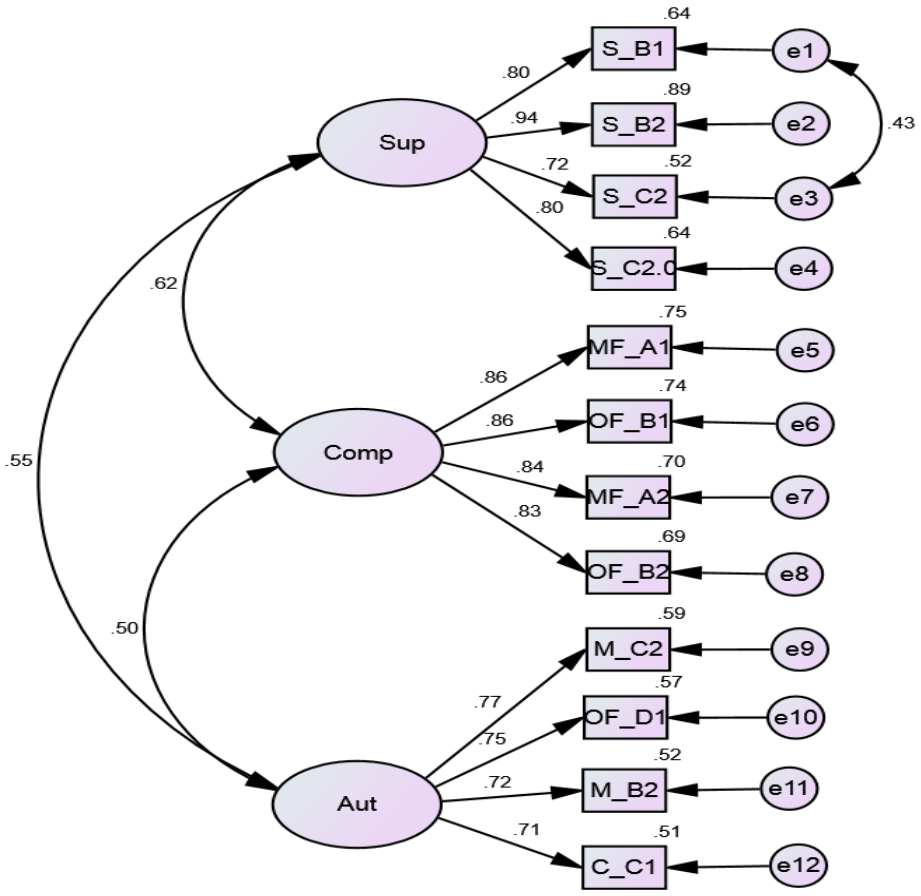
Item (Original Dimension Label)	Support	Competence	Autonomy
MC2…Motivated to build my capabilities over time			.774
OFD1…I had accepted my injury as an obstacle but one that provided an opportunity to grow			.763
MB2…Motivated to prove to myself that I could be better than I ever was before			.737
CC1…Confident because I had focused on all of the small goals in the rehabilitation process			.587
Cronbach's Alpha	.902	.909	.825

Note. S = support; C = competence; A = autonomy.



Chi-square = 141
df = 51
p < 0.001
CFI = 0.93
TLI = 0.89
RMSEA = 0.10

Figure 2.1. Exploratory Structural Covariance Model Standardized Fit Indices. Maximum likelihood (ML) model fit indices, standardized regression weights, and variance accounted for in individual items by the latent variable for the 12-iem, 3-factor, Military Mental Readiness to Return from Injury Instrument measurement model, fit to Study 1 data. df = degrees of freedom; CFI = comparative fit index; TLI = Tucker-Lewis index; = RMSEA; root mean square error of approximation.



Chi-square = 119.04
df = 50
p = .000
CFI = .95
RMSEA = .09
TLI = .92

Figure 2.2. Exploratory Structural Covariance Model Standardized Fit Indices with Error Covariance. Maximum likelihood (ML) model fit indices, standardized regression weights, and variance accounted for in individual items by the latent variable for the 12-iem, 3-factor, Military Mental Readiness to Return from Injury Instrument measurement model, fit to Study 1 data. df = degrees of freedom; CFI = comparative fit index; TLI = Tucker-Lewis index; = RMSEA; root mean square error of approximation.

Manuscript 3: Preliminary Construct Validity for the MMRRII using Multivariate Methods.

A multi-method approach has advanced the design and development of an instrument to measure an injured SMs' mental readiness to return to duty. The Military Mental Readiness to Return from Injury Instrument (MMRRII) began with the development of an initial item pool, then was refined through exploratory factor analysis (EFA), and finally examined via exploratory structural covariance modeling (ESCM) to determine preliminary fit of the model to the data. All three of these steps strongly supported initial factorial validity of the MMRRII. Construct validation, the process of assessing or establishing validity (Bryant, 2006), cannot be established by one study alone. Rather, Anastasi (1988) suggests that validation "involves a gradual accumulation of research evidence from a variety of sources." Although initial support for face, content, construct and factorial validity were derived from an expert panel, exploratory factor analysis, and exploratory structural covariance modeling, further support is necessary. Therefore, the purpose of this study was to further examine the MMRRII to find additional evidence to support construct validity.

Construct Validity

Instrument validation typically involves the examination of construct validity, which determines whether an instrument is measuring what it is supposed to measure (Bryant, 2006). Manuscript 1 offered a preliminary operational definition for military mental readiness to return to duty. This was further refined in Manuscript 2 as the extent to which an injured SM is mentally prepared to RTD was deemed contingent on their feelings of autonomy, competency, and support. The MMRRII was designed for multiple purposes, including: the utilization of intervention development models rather than merely identifying

a prognosis. A recent push towards human performance optimization and away from identifying readiness measures as an absence of negative outcomes, an approach primarily derived from the medical model, provided a functional framework for this instrument (Park, Messina, & Deuster, 2017). Therefore, the MMRRII can be administered at the onset of an injury to best inform practices which will complement physical rehabilitation in order to aid in the development of MR to RTD. Furthermore, the MMRRII should be re-administered at critical points in the rehabilitation process to assess intervention quality and inform necessary adjustments. Accordingly, it is of utmost importance to establish construct validity of the MMRRII, and to do so, three hypotheses of conceptual relevance were examined to provide information on the validity of the MMRRII using advanced multivariate statistical analyses.

Mental readiness profiles. The MMRRII consists of three subscales, including: Autonomy, Competence, and Support. Resulting scores suggest that individuals scoring higher on these three subscale should be associated with greater mental readiness to return to duty. To understand the differences among participants, a cluster analysis was employed in order to establish group profiles. Due to the nature of the developed MMRRII and the commentary provided by participants in Manuscript 1, Hypothesis 1 predicted at least 2 unique cluster profiles could be created representing high or low levels of MR.

Perceptions of mental readiness. The Integrated Model of Response to Sport Injury (Wiese-Bjornstal, Smith, Shaffer, and Morrey, 1998) postulates that athletes' response to injury is a result of personal and situational variables that affect the way athletes' think, feel, and act through a process of appraisal. This assumption of appraisal processes also appears relevant in the military context. Studies assessing attrition rates among injured trainees

(e.g.,Navy Basic Combat Training and Marine Basic Combat Training) supported this notion in that the injured recruits who had high graduation expectations were more likely to complete basic training than their injured peers who had low expectations (Booth-Kewley, Larson, Highfill-McRoy, 2009). Therefore, Hypothesis 2 predicted a strong positive relationship between perceptions of mental readiness and mental readiness to RTD scores.

Recovery time. The amount of time required to properly heal an injury varies from SM to SM (Thelen, Koppenhaver, Hoppes, Shutt, Musen, Davidson, & Williams, 2015). The adverse impacts that are associated with longer recovery periods also diverge based on numerous factors, including: the role the SM holds during the injury, the environment in which the injury and healing occurs, and the potential suspension of career progression (Gregg, Banderet, Reynolds, Creedon, & Rice, 2002). Typically the recovery process includes medical visits and limited duty days (e.g., medical restriction limiting physical activities or regular duties that are injury-related), each of which can delay or postpone the development of skills or progression of career status. Due to the potential for unfavorable impacts on career progression as a result of prolonged recovery time, Hypothesis 3 expected a strong negative relationship between recovery time and MR to RTD, suggesting that SMs' MR to RTD decreases as the time to recover increases.

Severity of injury. Although the majority of the injuries reported amongst the U.S. Armed Forces are musculoskeletal (Rhon, Teyhen, Shaffer, Goffar, Kiesel, & Pilsky, 2016), no recovery process is the same. Multiple confounding factors impact the recovery process, including: severity, impact on functioning, and compounding injuries (Bates, Boweles, Kilgore, & Solursh, 2008). Bates and colleagues (2008) reported that returning from significantly severe injuries is especially challenging for SMs. These challenges can also be

a by-product of underlying extrinsic motivations to RTD. Typically, non-combat related injuries that are severe enough to preclude the continuation of training, include: stress fractures, ankle sprains, knee injuries, and other musculoskeletal injuries (Booth-Kewley, Larson, Highfill-McRoy, 2009).

In Belmont, Schoenfeld, and Goodman's 2010 report on the epidemiology of combat injuries, they documented that the combat injuries experienced between 2001 and 2009 were unique to the modern warfare tactics employed by the enemy. These unconventional war tactics include ambush, improvised explosive devices (IEDs) and explosive mechanisms (i.e., mortars, rocket-propelled grenades, and landmines). As a result, 81% of the combat injuries documented in Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF) were due to explosions, which tend to affect multiple body regions. Clark, Bair, Buckenmaier, Gironda and Walker (2007) described the severity of combat injuries as unprecedented because they included both visible (i.e., tissue damage) and invisible (i.e., hearing loss, confusion) wounds. Blast injuries often result in multiple surgeries, which tend to be accompanied by significant levels of pain and emotional injuries (Clark et al., 2007). The typical protocol for severe combat injuries involves immediate emergency care, which is followed by transportation to a military treatment facility (MTF) in which they travel thousands of miles and are evaluated by multiple healthcare providers. This process has shown to be successful (90% survival rate following injury; Clark et al., 2007), but it also highlights the issue of effective pain management. Taking this into consideration, it is logical to assume that combat injuries are more severe in nature and are accompanied by prolonged periods requiring pain management. Therefore, Hypothesis 4 forecasted an inverse relationship between increased injury severity and MR to RTD.

Method

Data collected from Manuscript 2 was analyzed using advanced multivariate statistical analyses. This data included 166 service members (i.e. current and/or previous) who sustained an injury while serving in the U.S. Armed Forces. Thompson (2006) reported that multivariate methods control for inflation of Type I error rates, while simultaneously honoring the nature of the reality of the concepts being studied. Therefore, this study further examined the initial construct validity of the MMRRII utilizing multivariate methods.

Instrumentation

This investigation utilized the Military Mental Readiness to Return from Injury Instrument (MMRRII) and the Military Demographic Instrument.

Military Mental Readiness to Return from Injury Instrument (MMRRII). The MMRRII encompasses 12-items evenly distributed across 3 subscales. The MMRRII is designed to measure injured SMs level of mental readiness to return to duty. The subscales show acceptable internal consistency and include, Support ($\alpha = .90$), Autonomy ($\alpha = .83$), and Competence ($\alpha = .91$). It also demonstrated good model fit, CFI = .95 ; $\chi^2 (50) = 119.04$, $p < .001$; RMSEA = .09. The stem reads as "When it came time to return to duty following my injury, my mental readiness improved because I felt..." Respondents evaluate each item on a 6-point Likert scale, ranging from 1 (definitely false) to 6 (definitely true).

Injury Mental Readiness Demographics Instrument (IMRDI). The IRMDI included multiple demographic and background items aimed to assess individual differences (see Appendix E). These differences were military specific (i.e., branch, status, rank), injury specific (i.e., type, severity, combat/non-combat related,), and individually specific (i.e., gender, race, education, marital status). Three demographic variables were utilized for this

investigation, including: perceived mental readiness, recovery time, and injury severity. Perceived mental readiness to RTD was measured on a 10-point Likert scale, ranging from 0 (mentally unready) to 10 (total mental readiness). Recovery time was measured on a 4-point Likert scale, ranging from 1 (less than 1 month) to 4 (12+ months). Lastly, injury severity was measured on a 4-point Likert scale, ranging from 1 (minor) to 4 (severe).

Data Analysis Plan

This investigation utilized advanced multivariate statistical measures to further examine the validation process for the MMRRII. Because the data utilized was borrowed from Manuscript 2, it was already examined for missing cases, outliers, and multicollinearity issues. The data was examined using three data analysis techniques, including: (a) canonical correlation analysis, (b) linear regression and (c) cluster analysis with multivariate (MANOVA) and univariate (ANOVA) follow-up.

Canonical correlation. The data was first examined using the canonical correlation analysis, which is the most general case of the parametric general linear model (Thompson, 2006). Utilizing SPSS, Version 25 allowed for a new approach to conducting this analysis. Because the new version offers a canonical correlation function, the syntax approach was no longer warranted. The analysis was used to measure the size and direction of the relationships between two sets of variables. Set 1 was established to incorporate the three subscales of the MMRRII, including; Autonomy, Competence, and Support. Set 2 was designed to include; recovery time and severity of injury. The canonical correlation was run using SPSS, Version 25. Once significance was established, results were checked for amount of variance accounted for through three steps, including: variance overlap between variates in a pair, variance overlap between a variate and its own set of variables, and

variance overlap between a variate and the other set of variables. Then the linear combinations of variables was interpreted by investigating the standardized canonical correlation coefficients and canonical loadings for both sets.

Linear regression analysis. The regression analysis was chosen to predict a score on the perceived mental readiness variable from the MR variable score computed from the MMRRII subscales.

Cluster analysis. The secondary multivariate analysis procedure utilized was the K-means cluster analysis. Cluster analysis was chosen because it provides a method to group participants rather than variables. Therefore, participants were grouped based on their scores on the dimensions (i.e., Competence, Autonomy, and Social Support) of the MMRRII, after the dimensions were first transformed into Z scores. The cluster analysis was then run using a K-means nonhierarchical clustering method in order to reveal relationships among the participants. Careful attention was placed on the representativeness of the sample and multicollinearity to ensure proper interpretation of results.

Multivariate analysis of variance (MANOVA). Following the cluster analysis, a multivariate analysis of variance (MANOVA) was used to assess group differences between the group profiles for injury severity and recovery time. For MANOVA analyses, if the Wilk's lambda was significant, then follow-up univariate analyses of variance (ANOVA) were run to examine which variables were significant. The ANOVAs included Tukey's post hoc analyses to illuminate differences between specific profile groups. The evaluation of significance across all analyses was set at $p < 0.05$.

Analysis of variance (ANOVA). A separate ANOVA was run to assess group differences between the cluster profiles and perceived mental readiness.

Results

Canonical Results

A canonical correlation analysis was conducted using injury severity and recovery time as one set of variables and the three mental readiness dimensions as the second variable set, in order to examine the multivariate shared relationship between the two variable sets. Previous measures completed in Manuscript 2 supported that assumptions of linearity, multivariate normality, and homoscedasticity were met. Only the first canonical correlation was interpreted because it was the only significant correlation, 0.46 (21% overlapping variance), $F(6, 320) = 6.84$; $p < .001$. The correlations and canonical coefficients are included in Table 3.1.

In the calculation of the CV score for Set 1, Competence and Social Support contributed the most (.71 and .52, respectively). However, further investigation into the canonical loadings revealed that all three dimensions are correlated and make a contribution to the CV (Competence, 0.91; Social Support, 0.83; Autonomy, 0.39).

Set 2 included injury severity and recovery time in the calculation of the CV score. Recovery time contributed most to the score (-0.77) but injury severity showed a moderate contribution (-0.40). Upon examination of the correlations of variables in the sets with the canonical variates, both variables are highly correlated and make large contributions to the CV (recovery time, -0.9; injury severity, -0.71).

Linear Regression Results

A multiple linear regression analysis was conducted to determine the best linear combination of perceived mental readiness and MR scores (i.e., three subscales, including: Competence, Autonomy, and Social Support). The means, standard deviations, and intercorrelations can be found in Table 3.2. This combination of variables significantly predicted perceived mental readiness, $F(3,161) = 59.92$, $p < .001$. Competence was the only variable that significantly contributed to the prediction of participants' perceived mental readiness. The results showed an R^2 of .53, which indicated that 53% of the variance in perceived mental readiness was explained by the model.

Cluster Results

A cluster analysis was conducted utilizing the nonhierarchical K-Means Cluster analysis. The four cluster solution seemed most interesting and relevant and also showed conceptual congruence with the previous manuscripts (see Figure 3.1). Additionally, the cluster profile distribution of participants was acceptable, $n = 52, 44, 33, 33$ (respectively).

Cluster 1 was labeled 'Mentally Prepared' because all three subscale scores were >.5 SD above the mean. The second cluster profile was labeled 'Mentally Prepared, Low Autonomy' because the support and competence subscale scores were approaching 0.5 SD above the mean while the autonomy subscale score was approaching 0.5 SD below the mean. Conversely, Cluster 3 was labeled 'Mentally Unprepared, High Autonomy' because the autonomy subscale score was approaching 0.5 SD above the mean, while the support subscale score approached 0.5 SD below the mean and the competency subscale score surpassed 0.5 SD below the mean. Lastly, the fourth cluster was labeled 'Mentally Unprepared' because all three subscale scores were approaching 1.5 SDs below the mean.

MANOVA, ANOVA and Post Hoc Results

Multivariate Analysis of Variance (MANOVA) with univariate (ANOVA) follow-up were used to examine profile differences among the cluster profiles for recovery time and severity of injury (see Table 3.3). Results indicated a statistically significant multivariate main effect, $F(3, 161) = 6.56$, $p < .001$; Wilks Lambda = .79; partial $eta^2 = .11$. Subsequent ANOVAs indicated that both variables differed significantly across the four groups, including: (a) recovery time, $F(3, 161) = 10.92$, $p < .001$; partial $eta^2 = .17$ and (b) injury severity, $F(3, 161) = 6.47$, $p < .001$; partial $eta^2 = .11$.

The post hoc results indicated that the recovery time variable showed significant differences across cluster groups, including: (a) Clusters 1 and 3, (b) Clusters 1 and 4, (c) Clusters 2 and 3, and (d) Clusters 2 and 4. The means for recovery time were higher for Clusters 3 and 4, suggesting that who were mentally unready had longer recovery time than those in Clusters 1 and 2.

The post hoc results further documented statistically significant differences for the injury severity variable, including: (a) Clusters 1 and 3, (b) Clusters 1 and 4, (c) Clusters 2 and 3, and (d) Clusters 2 and 4 (e) Clusters 3 and 4. Injury severity means were slightly higher among Clusters 3 and 4 than 1 and 2, suggesting that those who scored mentally unready to RTD suffered from more severe and traumatic injuries than the other two cluster groups.

The post hoc tests demonstrated that those who exhibited more mental readiness experienced less severe injuries and shorter recovery times. Alternatively, those who were deemed mentally unready experienced more severe injuries that required longer recovery

time. Finally, these results suggest that mental readiness, regardless of level of autonomy, exhibited an inverse relationship with injury severity and recovery time.

Discussion

The intent of this investigation was to further examine the validity of the MMRRII utilizing advanced multivariate statistical analyses. The statistical analyses included: (a) Canonical correlation, (b) linear regression analysis, (c) K-Means Cluster, and (d) MANOVA with ANOVA follow-up. Analyses compared the 3-factor MMRRII to perceived mental readiness, recovery time, and injury severity across four hypotheses. The results from these analyses offer further support for the validity of the MMRRII.

MMRRII Cluster Comparisons

Detailed accounts of injury rehabilitation experiences gathered during Manuscript 1 offered a foundational conceptualization of the cluster groupings derived from the K-means cluster analysis. This analysis demonstrated four statistically significant clusters, including: (a) Mentally Prepared, MP;, (b) Mentally Prepared, Low Autonomy, MPLA; (c) Mentally Unprepared, High Autonomy, MUHA; and (d) Mentally Unprepared, MU. The MP and MU groups were perhaps not quite as interesting as the MPLA and MUHA groups because of the obvious polar nature of the MR construct, but they did generally support Hypothesis 1.

The MPLA and MUHA were further examined for conceptual understanding of the ability of the MMRRII to measure MR validly. The MPLA profile consisted of higher than the mean scores for support and competency with lower than the mean score on autonomy. This profile suggests that injured SMs who feel they have the necessary support and are capable of returning to duty may simply lack in the motivation to do so. SDT also identifies causality orientations (i.e., how individuals adapt and orient themselves to their environment

and their degree of self-determination in general), which are broken into three categories, including; autonomous, controlled, and impersonal. The controlled causality orientation is representative of competence and relatedness needs being satisfied while autonomy is not. The MPLA profile fits the description of causality orientation. Furthermore, a sub-theory of SDT is the Cognitive Evaluation Theory (CET), which helps explain intrinsic and extrinsic motivation. Intrinsic motivation requires both competency and autonomy. Therefore, the MPLA profile seems to represent individuals who held a controlled causality orientation as well as extrinsic motivation to RTD following an injury. An example of the MPLA profile can be better understood by the comment made by Golf in Manuscript 1:

> I know for my position I could really milk that profile for as long as I wanted to, but she just straight up asked me like do you feel ready and if I said no she would've extended the profile. I know there's a lot of soldiers out there that do that and they'll keep milking that profile until they do feel mentally ready even if all the x-rays, all the MRIs are saying hey you're physically ready, they'll find something, like oh no it still tweaks if I do sit ups or if I do pushups I just I'm not ready and you can keep pushing that out over and over again. I think if you're not mentally ready yet you're always going to find a way within your power until the military tells you, you can't anymore.

The MUHA profile conversely consisted of a higher than normal mean score on autonomy and lower than normal mean score on support and competence. This profile suggests that there is a lack of mental readiness due to low levels of support and competence in ability to RTD despite the presence of motivation to RTD. Although this profile does not meet the determinants of self-determined motivation (Ryan & Deci, 2000), it does suggest that the individuals felt some level of control over their behavior. Perhaps the individuals' of the MUHA profile were more representative of fostering an ego goal orientation, which focuses on demonstrating superior ability rather than task mastery. Typically, ego-involved goals coupled with

low levels of competence results in maladaptive behaviors (Magyar & Duda, 2000), such as low levels of MR to RTD.

Another potential consideration is that this profile could be more representative of a stage of rehabilitation, meaning that MR is first established by the desire or motivation to build mental readiness. Therefore, levels of support and competence may be low, but the motivation to seek out support and increase competency levels might be the foundation to establishing mental readiness. This notion is supported by India's comment from Manuscript 1:

> I would say asking for help and talk to your peers. If you had that type of motivation you could mentally get yourself ready to get yourself back and also doing your own research on the injury and the healing process and what you need to do to get yourself back to it and just trusting the overall process. Yeah it might be slow but with time it'll get better.

Perceptions of Mental Readiness

This investigation expected to see a strong positive relationship between scores of MR to RTD from the MMRRII and scores of perceived mental readiness measured on a 10-point Likert scale. A linear regression analysis demonstrated strong support for Hypothesis 2. The regression analysis yielded a significant prediction of perceived mental readiness. Of the three MR variables, Competence was the only variable that significantly contributed to the prediction of participants' perceived mental readiness. This finding further illuminated Bandura's (1997) social cognitive theory, which indicated that efficacy judgements regarding the ability to successfully return from rehabilitation were impacted by efficacy beliefs adopted during rehabilitation. This finding suggested that participants' perceptions of mental readiness was matched with their competency to return to duty, ultimately providing preliminary evidence to support face validity of the MMRRII.

Recovery Time

To assess Hypothesis 3, which expected a strong negative relationship between recovery time and MR scores, the following multivariate analyses were utilized: Canonical correlation, MANOVA, ANOVA, and post hoc follow up tests. The canonical correlation results suggested that recovery time made a large contribution to the CV (-0.9). Further examination of the 4-cluster profile group demonstrated that recovery time contributed most to distinguishing the groups, particularly differentiating MP from the other three clusters. The subsequent followup analyses yielded perhaps the most support for Hypothesis two. This support was demonstrated by higher mean scores for the MUHA and MU profiles. The highest mean score was representative of 240+ days of recovery time which was associated with the MU profile. This resulting data supports previous research by Malish, Arnett and Place (2014), which reported that after 240 days in rehabilitation, soldiers' prognosis for RTD was no longer favorable. Ultimately, Clusters 3 and 4, which were most associated with lower levels of MR, experienced longer time to recover, thus suggesting a negative relationship between MR and recovery time, which therefore supported the Hypothesis 3.

Injury Severity

The fourth hypothesis expected an inverse relationship between injury severity and MR to RTD. The results from the canonical correlation suggested that injury severity had a moderate contribution to the CV score. The MANOVA results showed that injury severity significantly distinguished the MP from the MPLA Cluster profiles. Upon further examination of the profiles, comparisons of the severity of injury also produced interesting results. The higher mean scores represented increased injury severity and were associated

with the MUHA and MU cluster profiles. These results suggest that the increased severity likely inhibits levels of MR to RTD, supporting Hypothesis 4.

Limitations and Future Directions

The researcher's intent for the MMRRII is to provide a psychometrically sound instrument to guide cognitive interventions grounded in sport and performance psychology that compliment injured SMs' physical rehabilitation. In order for this to come to fruition, the MMRRII must be rigorously analyzed and the construct of MR to RTD must be adequately understood. In this investigation, the researcher sought to produce preliminary evidence to support the efficacy of the MMRRII and to call to action future investigation into better sport psychology resources for injured SMs. To clarify, the administration of the MMRRII should be grounded in the philosophy of intervention development rather than a diagnostic tool. In order to develop an efficacious intervention, the MR scores should be accompanied by the consideration of the four profiles as well as the severity of injury, recovery time, and the SMs' perceptions of MR. Further development should consider additional determinants of MR such as, external factors (i.e., effect on career progression, pain management resources, amount of personal versus facility required rehabilitation time, involvement with unit and/or duties) and internal factors (i.e., personality, coping styles, injury rehabilitation knowledge, and successful rehabilitation of previous injuries).

In this investigation, the researcher sought to provide additional support to the validation of the MMRRII. The statistical analyses did support preliminary hypotheses regarding the validity of this instrument. This support manifested itself in

several forms, including: cluster groups, which conceptually and empirically supported predictions yielded from Manuscripts 1 and 2 and previous research. Although the empirical findings are provocative, they are limited, therefore conclusions and implications should be viewed as tentative and subject to modification as advancement of this investigation continues.

This investigation was limited by the lack of theoretically powerful variables. In addition, the injury background variables chosen consisted of only four data points making statistical significance less meaningful. Future research should also investigate antecedent and consequence variables that have stronger theoretical relevance, including: (a) mindsets, (b) mental toughness, (c) perceptions of improvement, and (d) post-traumatic growth. These variables should be examined for their relationship with the clusters for comparison purposes. Furthermore, the investigation of a working model including these variables could propel the significance of this research substantially.

The most limiting factor of this investigation was the sample of participants. The sample demonstrated biases related to demographics (i.e., gender, race, marital status), military-specific background (i.e., branch of service), and type of injury (i.e., non/combat-related). Future research should not only focus on a sample more representative of the U.S. Armed Forces but should also assess the effectiveness and generalizability of the MMRRII across injury type, injury severity, military branch, and military roles (i.e., Military Occupation Specialties, MOS). The range of these factors varied greatly across the sample in this investigation and should be

accompanied with follow up studies investigating the usefulness in specified populations.

Considering the impact that autonomy played on differentiating the cluster profiles, future research should diligently examine the levels, sources, and impediments of autonomy SMs experience throughout their career. In doing so, researchers can attempt to identify the areas in which SMs can take control of their rehabilitation and RTD in an effort to promote healing, well-being and overall readiness. Additionally, longitudinal investigations that look into the long-term effects of returning to duty with differing levels of MR could provide interesting evidence to emphasize the value of understanding and developing military MR to RTD instruments and protocols. Ultimately, this research sought to enhance the conversation surrounding holistic care for injured SMs, and in doing so, places a call to action for future researchers and practitioners to continue the dialogue and carry the torch forward.

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Table 3.1. *Correlations and Standardized Canonical Coefficients*

	Loadings	Coefficients
Set 1		
Social Support	.83	.52
Competence	.91	.71
Autonomy	.39	-.20
Set 2		
Injury Severity	-.70	-.40
Recovery Time	-.93	-.77

Table 3.2. *Correlations, Means and Standard Deviations from Linear Regression Results*

	PMR	Autonomy	Competence	Social Support	*Mean*	*SD*
PMR	-				6.59	3.00
Autonomy	.38	-			4.11	1.03
Competence	.72	.47	-		3.83	1.31
Social Support	.47	.49	.57	-	3.97	1.36

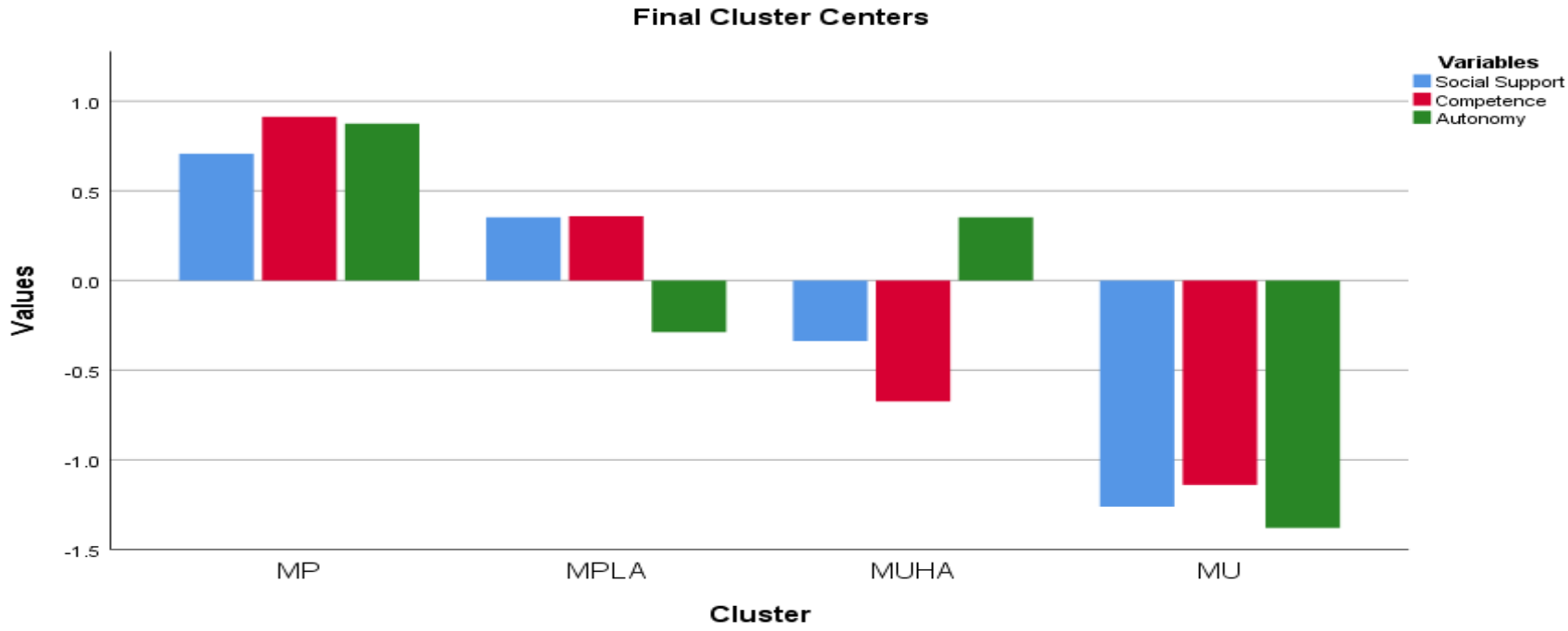
Note. Correlations, means, and standard deviations (SD) for perceived mental readiness and MR scores from the MMRRII subscales are reported above and below the diagonal, respectively.

Table 3.3. *MANOVA Results Comparing Injury Severity and Recovery Time with 4-Cluster Profiles*

	Mentally Prepared (MP)		Mentally Prepared, Low Autonomy (MPLA)		Mentally Unprepared, High Autonomy (MUHA)		Mentally Unprepared (MU)			
	N = 52		N = 44		N = 36		N = 33			
	M	**SD**	**M**	**SD**	**M**	**SD**	**M**	**SD**	**F**	**eta^2**
Severity	-.32	.91	-.23	.98	.37	.96	.39	.98	6.47**	.11^{bcde}
Recovery Time	-.34	.93	-.32	.96	.24	.91	.68	.87	10.92**	.17^{bcde}

Note. Significance between profile groups is denoted by a = P1 vs. P2, b = P1 vs. P3, c = P1 vs. P4, d = P2 vs. P3, e = P2 vs. P4, f = P3 vs. P4. ** <0.001.

Figure 3.1. 4-Cluster Profiles



Note. MP = Mentally Prepared; MPLA = Mentally Prepared, Low Autonomy; MUHA = Mentally Unprepared, High Autonomy; MU = Mentally Unprepared.

Appendix A

Institutional Review Board Approval

University *of* Idaho
Office of Research Assurances
Institutional Review Board
875 Perimeter Drive, MS 3010
Moscow ID 83844-3010
Phone: 208-885-6162
Fax: 208-885-5752
irb@uidaho.edu

To: Damon Burton

Cc: Julianne Giusti

From: Jennifer Walker, IRB Coordinator

Approval Date: February 15, 2018

Title: Operation Return to Duty: Mental Readiness to Return to Duty Following Injury Rehabilitation

Project: 18-026
Certified: Certified as exempt under category 2 at 45 CFR 46.101(b)(2).

On behalf of the Institutional Review Board at the University of Idaho, I am pleased to inform you that the protocol for the research project Operation Return to Duty: Mental Readiness to Return to Duty Following Injury Rehabilitation has been certified as exempt under the category and reference number listed above.

This certification is valid only for the study protocol as it was submitted. Studies certified as Exempt are not subject to continuing review and this certification does not expire. However, if changes are made to the study protocol, you must submit the changes through VERAS for review before implementing the changes. Amendments may include but are not limited to, changes in study population, study personnel, study instruments, consent documents, recruitment materials, sites of research, etc. If you have any additional questions, please contact me through the VERAS messaging system by clicking the 'Reply' button.

As Principal Investigator, you are responsible for ensuring compliance with all applicable FERPA regulations, University of Idaho policies, state and federal regulations. Every effort should be made to ensure that the project is conducted in a manner consistent with the three fundamental principles identified in the Belmont Report: respect for persons; beneficence; and justice. The Principal Investigator is responsible for ensuring that all study personnel have completed the online human subjects training requirement.

You are required to timely notify the IRB if any unanticipated or adverse events occur during the study, if you experience and increased risk to the participants, or if you have participants withdraw or register complaints about the study.

Appendix B

Consent Form, Manuscript 1: Qualitative Focus Group and One-on-One Interviews

Mental Readiness to Return to Duty

The University of Idaho Institutional Review Board has certified this project as Exempt.

We would like to offer our sincerest thank you for your help with the study of mental readiness to return to duty following an injury. As the breadth of knowledge on this crucial topic continues to evolve it is of the utmost importance that we understand the progress of the psychology of injury and are able to recognize where improvements can be made in crucial populations like the U.S. Armed Forces.

Your input and participation is vital to the project on the issue. This project will consist of one group meeting in which you will have the opportunity to share your injury experience with the researcher and fellow injured service members. This group meeting will last no longer than 2 hours and anonymity of name, rank, and military job will be kept private from other group members. Following the group meeting, there will be a one-on-one interview with you and the researcher in order to re-visit the experiences on a personal level. By participating in this process, you can help us understand what gaps in knowledge exist, where misconceptions in the psychology of injury are developed, and identify what key components of psychological readiness ensure a functioning level of proficiency for injured service members returning to duty. The data collected from this project will likely inform best practices for future practitioners who assist in the physical and psychological rehabilitation of injured service members.

Your participation in this project is voluntary and will be kept confidential. During the group meeting your name, rank, and military job will be kept private from other group members. Although the researchers will keep the information confidential, they cannot control what others in the focus group discuss outside of the focus group. All information collected will be placed in a locked file cabinet and/or computer with firewall protection that only the researchers can access.

There are no or minimal risks associated with this project. Participants reserve the right to refuse participation at any time with no penalty. There are no consequences associated with the participant's decision to withdraw from the research study.

If you have any questions about this project do not hesitate to contact, Julianne Giusti at gius0470@vandals.uidaho.edu, (904)705-1269 or Dr. Damon Burton at dburton@uidaho.edu, (208)310-0893.

This study has been reviewed and approved by the Institutional Review Board, and if you have any questions about your rights as a participant in this study, they can be reached at 208-885-6340.

I have reviewed this consent form and understand and agree to its contents.

Participant Name Julianne Giusti	Participant Signature	Date
Experimenter Name	Experimenter Signature	Date

Appendix C

Focus Group, Semi-Structured Interview

1. Do you believe being mentally ready to return to duty is the same as being physically ready to return to duty? If so, how? IF not why?
2. What does it mean for an injured service member to be mentally ready to return to duty?
3. How does one know if they're mentally ready to return to duty after an injury?
4. How does one know if they're not mentally ready to return to duty after an injury?
5. How does one develop mental readiness to return to duty?
6. How does mental readiness impact the likelihood of returning to duty?
7. How does mental readiness impact post return to duty performances?
8. After talking through all of this, is there anything that may still be lingering, anything that you want to re-address, anything we didn't address that you think is relevant or important or any questions that may have come up?

*Probes and follow up questions were used throughout the focus groups.

One-on-One Follow-up, Semi-Structured Interview;

1. After having time to reflect on the conversations had in the group, what would you like to express
2. Please define what it means to you personally to be mentally ready to return to duty from your injury
3. Please include anything you think is important for us to know about injured service members experiences
4. Please include anything you think is important for us to know about mentally preparing to return to duty
5. What was not discussed in the group that you feel is worth mentioning

*Probes and follow up questions were used throughout the interviews.

Appendix D

Injury Mental Readiness Military Demographic Instrument

Military-Specific Background

1. Please indicate which branch of service you participated in while your injury occurred
    - Air Force
    - Army
    - Coast Guard
    - Marine
    - Navy

2. Please indicate which military component you participated in while your injury occurred
    - Active Duty
    - National Guard
    - Reserve
    - ROTC

3. Please indicate which rank you held while your injury occurred
    - Enlisted _____
    - Officer _____

4. Please select which conflict(s) was occurring while you were injured
    - Operation Enduring Freedom (OEF)
    - Operation Iraqi Freedom (OIF)
    - Operation New Dawn (OND)
    - Islamic State-Operation Inherent Resolve (OIR)
    - Other

5. Did your military status change as a result of your injury
    - Yes _____
    - No

6. Please indicate your current military status
    - Active Duty-Full time
    - Active Duty- Part time
    - Separated
    - Retired

Injury Specific Background

7. Please rate on the below spectrum, how mentally ready you felt as you returned to duty from your injury

Mentally Unready Somewhat Mentally Ready Total Mental Readiness

○ ○ ○ ○ ○ ○ ○ ○ ○ ○

8. Please select which best describes your injury(ies) experience
    - Combat related
    - Non-combat related
    - Both combat and non-combat related (please explain)

9. Please indicate the length of recovery from your injury
    - Less than 1 month
    - 1-6 months
    - 6-12 months
    - 12+ months

10. Did your injury result in an amputation
    - Yes
    - No

11. Please indicate the injured body part
    - _____

12. Please describe the type of injury you sustained
    - _____

13. Please select which option(s) best describe your injury
    - Minor
    - Moderate
    - Traumatic
    - Severe

14. How long ago did your injury occur
    - Less than 2 weeks ago
    - 1-3 months ago
    - 3-6 months ago
    - 6-9 months ago
    - 9-12 months ago
    - 1-2 years ago
    - 2–3 years ago
    - 3+ years ago

Demographic Background

15. Please indicate which best describes your gender
    - Male
    - Female
    - Do not wish to answer

16. Please indicate which best describes your race
    - Black or African American
    - American Indian or Alaska Native
    - Asian
    - Latino, Spanish, or Hispanic
    - White or Caucasian
    - Other
    - Do not wish to answer

17. Please indicate your current marital status
    - Married
    - Widowed
    - Divorced
    - Separated
    - Never Married

18. Please indicate your present educational status
    - High school or GED
    - Some college
    - Associate degree
    - Bachelor’s degree
    - Master’s degree or higher

Appendix E

MMRRII-Version B; Qualtrics Format

Consent For Participation in a Research Study

Mental Readiness to Return to Duty

The University of Idaho Institutional Review Board has certified this project as exempt. We would like to offer our sincerest thank you for your help with the study of mental readiness to return to duty following an injury. As the breadth of knowledge on this crucial topic continues to evolve, it is of the utmost importance that we understand the progress of the psychology of injury and are able to recognize where improvements can be made in crucial populations like the U.S. Armed Forces. Your input and participation is vital to understanding this issue. This project will consist of the completion of a questionnaire that should take no more than 15 minutes to complete. By participating in this questionnaire, you can help us understand what gaps in knowledge exist, where misconceptions in sport psychology and the military are developed, and identify what key components of mental readiness ensure a functioning level of proficiency for injured service members returning to duty. The data collected from this project will likely inform best practices for future practitioners who assist in the physical and psychological rehabilitation of injured service members. Your participation in this project is voluntary and will be kept confidential. All information collected will be placed in a locked file cabinet and/or computer with firewall protection that only the researchers can access. There are no or minimal risks associated with this project. Participants reserve the right to refuse participation at any time with no penalty. There are no consequences associated with the participant's decision to withdraw from the research study. If you have any questions about this project do not hesitate to contact, Julianne Giusti at gius0470@vandals.uidaho.edu, (904)705-1269 or Dr. Damon Burton at dburton@uidaho.edu, (208)310-0893.

This study has been reviewed and approved by the Institutional Review Board, and if you have any questions about your rights as a participant in this study, they can be reached at 208-885-6340.

By choosing 'yes' I acknowledge that I am at least 18 years old, I have sustained an injury during my time in the U.S. Armed Forces (combat or non-combat related) and that I am willing to complete this questionnaire.

- Yes (1)
- No (2)

Skip To: End of Survey If By choosing 'yes' I acknowledge that I am at least 18 years old, I have sustained an injury durin... = No

Did you experience an injury during your service?

- Yes (1)
- No (2)

Did you return to duty after your injury healed?
(Answer yes even if your duty status changed)
(If no, please explain whether you were separated, etc.)

- Yes (1) _____
- No (2) _____

Please rate on the below spectrum, how **mentally ready** you felt as you returned to duty from your injury.

- Mentally Unready (1)
- (2)
- (3)
- (4)
- Somewhat Mentally Ready (5)
- (6)
- (7)
- (8)
- (9)
- Total Mental Readiness (10)

Directions: The following questions are designed to gauge the *level of mental readiness* you felt in your return to duty following the completion of your injury rehabilitation. *If your injury is not current*, please try to think back to how you thought and felt during your return when answering the questions.

There is no right or wrong answer, we are looking for your opinion. Answer with the first response that comes to mind rather than debating on your answer. Please answer each question with the best response for describing ***how true*** each statement is for you.

When it came time to return to duty following my injury, my mental readiness improved because I felt...

	Definitely True (1)	**True** (2)	**Somewhat True** (3)	**Somewhat False** (4)	**False** (5)	**Definitely False** (6)
I had surpassed physical limits I was unsure I would reach. (OF_A1)	○	○	○	○	○	○
I no longer questioned if my body was prepared to return. (C_A1)	○	○	○	○	○	○
Motivated to return to contribute to my unit. (M_A1)	○	○	○	○	○	○
I could focus solely on the mission and not on my injured body part. (MF_A1)	○	○	○	○	○	○
That those important to me recognized that medical tests aren't the only measurement of my level of readiness to return to duty (S_A1)	○	○	○	○	○	○
I had grown stronger through the adversity of the injury. (OF_A2)	○	○	○	○	○	○
Confident that one small movement would not cause re-injury. (C_A2)	○	○	○	○	○	○

When it came time to return to duty following my injury, my mental readiness improved because I felt...

	Definitely True (1)	**True** (2)	**Somewhat True** (3)	**Somewhat False** (4)	**False** (5)	**Definitely False** (6)
Motivated to return to participate in trainings and missions. (M_A2)	O	O	O	O	O	O
I could focus on performing my role in missions and not worry about re-injury. (MF_A2)	O	O	O	O	O	O
Supported in my mental recovery as much as my physical recovery. (S_A2)	O	O	O	O	O	O
I could perform my duties without limiting myself or over compensating. (OF_B1)	O	O	O	O	O	O
Confident because I had more knowledge on how to keep myself healthy and avoid re-injury. (C_B1)	O	O	O	O	O	O
Motivated to come back stronger than before. (M_B1)	O	O	O	O	O	O
Capable of recognizing when my focus on re-injury would make me a liability to my unit and/or mission. (MF_B1)	O	O	O	O	O	O
My unit had my back during the recovery process. (S_B1)	O	O	O	O	O	O
I had the ability to fulfill my duties without hesitation. (OF_B2)	O	O	O	O	O	O

When it came time to return to duty following my injury, my mental readiness improved because I felt...

	Definitely True (1)	**True** (2)	**Somewhat True** (3)	**Somewhat False** (4)	**False** (5)	**Definitely False** (6)
Confident because I understood the proper rehabilitation movements to promote healing. (C_B2)	O	O	O	O	O	O
Motivated to prove to myself that I could be better than I ever was before. (M_B2)	O	O	O	O	O	O
I was no longer a liability to my unit in our missions/operations because I didn't focus on re-injury. (MF_B2)	O	O	O	O	O	O
My unit supported me upon my return to duty. (S_B2)	O	O	O	O	O	O
I found a way to conquer my fear of re-injury. (OF_C1)	O	O	O	O	O	O
Confident because I had focused on all of the small goals in the rehabilitation process. (C_C1)	O	O	O	O	O	O
Motivated to trust the rehabilitation process to allow complete healing (M_C1)	O	O	O	O	O	O
My identity was restored. (MF_C1)	O	O	O	O	O	O
My chain of command had my back during the recovery process. (S_C2)	O	O	O	O	O	O

When it came time to return to duty following my injury, my mental readiness improved because I felt...

	Definitely True (1)	**True** (2)	**Somewhat True** (3)	**Somewhat False** (4)	**False** (5)	**Definitely False** (6)
I had faced my fears of re-injury. (OF_C2)	O	O	O	O	O	O
Confident that I could continue to attain small successes in my return to duty. (C_C2)	O	O	O	O	O	O
Motivated to build my capabilities over time. (M_C2)	O	O	O	O	O	O
My identity was no longer defined by my injury. (MF_C2)	O	O	O	O	O	O
My chain of command supported my return to duty. (S_C2)	O	O	O	O	O	O
My medical staff saw me as more than just a number. (S_D1)	O	O	O	O	O	O
Maintaining social involvement with my unit supported my recovery. (S_E1)	O	O	O	O	O	O
I had accepted my injury as an obstacle but one that provided an opportunity to grow. (OF_D1)	O	O	O	O	O	O
Supported by the medical staff. (S_D2)	O	O	O	O	O	O
Maintaining altered involvement in operations/missions/daily tasks supported my recovery. (S_E2)	O	O	O	O	O	O

When it came time to return to duty following my injury, my mental readiness improved because I felt...

	Definitely True (1)	**True** (2)	**Somewhat True** (3)	**Somewhat False** (4)	**False** (5)	**Definitely False** (6)
I had taken the small steps in my rehabilitation incrementally over time and felt comfortable to return. (OF_D2)	O	O	O	O	O	O
I was the only person standing in my way of being mentally ready to return to duty. (CUT1)	O	O	O	O	O	O
Confident that I could return without holding myself back. (CUT6)	O	O	O	O	O	O
I had progressed enough physically to feel secure in my ability to return. (CUT2)	O	O	O	O	O	O
Motivated to return to duty. (CUT8)	O	O	O	O	O	O
Confident in my ability to prevent future injury. (CUT7)	O	O	O	O	O	O
I didn't think before I reacted. (CUT3)	O	O	O	O	O	O
I was no longer aware of my fears of re-injury. (CUT4)	O	O	O	O	O	O
I could trust my ability to perform my duties without worry. (CUT5)	O	O	O	O	O	O
Motivated to push past fears and build mental toughness. (CUT9)	O	O	O	O	O	O

DEMOGRAPHIC QUESTIONS

Please provide responses to the following questions related to background information.

Please select which conflict(s) was occurring while you were injured...

- Operation Enduring Freedom (OEF) (1)
- Operation Iraqi Freedom (OIF) (2)
- Operation New Dawn (OND) (3)
- Islamic State- Operation Inherent Resolve (OIR) (4)
- Other (5) _____

Please select which best describes your injury(ies) experience

- Combat related (1)
- Non-combat related (2)
- Both combat and non-combat related (please explain) (3)
  _____

Please indicate which branch of service you participated in while your injury occurred

- Air Force (1)
- Army (2)
- Coast Guard (3)
- Marine (4)
- Navy (5)

Please indicate which military component you participated in while your injury occurred

- Active Duty (1)
- National Guard (2)
- Reserve (3)
- ROTC (4)

Please indicate which rank you held while your injury occurred

- Enlisted (1) _____
- Officer (2) _____

Please indicate your *current* military status

- Active Duty- Full time (1)
- Active Duty- Part time (2)
- Separated (3)
- Retired (4)

Please indicate which best describes your gender

- Male (1)
- Female (2)
- Do not wish to answer (3)

Please indicate which best describes your race

- Do not wish to answer (1)
- Black or African American (2)
- American Indian or Alaska Native (3)
- Asian (4)
- Latino, Spanish, or Hispanic (5)
- White or Caucasion (6)
- Other (7)

Please indicate your current marital status

- Married (1)
- Widowed (2)
- Divorced (3)
- Separated (4)
- Never married (5)

Please indicate your present education status

- High school or GED (1)
- Some college (2)
- Associate degree (3)
- Bachelor's degree (4)
- Master's degree or higher (5)

Please indicate the length of recovery from your injury

- Less than 1 month (1)
- 1-6 months (2)
- 6-12 months (3)
- 12+ months (4)

Did your injury result in an amputation?

- Yes (1)
- No (2)

Did your military status change as a result of your injury?

- Yes, please explain how (1) _____
- No (2)

Please indicate the injured body part
(For example, left foot, shoulder, etc.)

_____

Please describe the type of injury you sustained
(For example broken foot, stress fracture, etc.)

_____

Please select which option(s) best describe your injury

- Severe (1)
- Traumatic (2)
- Moderate (3)
- Minor (4)

How long ago did your injury occur?

- Less than 2 weeks ago (1)
- 1-3 months ago (2)
- 3-6 months ago (3)
- 6-9 months ago (4)
- 9-12 months ago (5)
- 1-2 years ago (6)
- 2-3 years ago (7)
- 3+ years ago (8)

Thank you for taking the time to complete this questionnaire. Your input is crucial to the understanding and development of comprehensive resources for injured U.S. Armed Forces.

If you'd like to complete a follow up survey regarding this topic or receive resulting information please provide your email contact below.

Email contact

Appendix F

Solicitation Materials

Appendix G

Research Match Announcement

A research team with University of Idaho in Moscow, ID, believes you might be a good match for the following study:

Dear Veteran participant,

You are invited to participate in a study entitled “Mental Readiness to Return to Duty Following an Injury.” This study is designed to inform sport psychology practitioners on how to compliment physical rehabilitation with cognitive enhancement techniques in order for a safe and efficient return to duty. As a Veteran, we seek to understand your injury experience in order to establish a better understanding of what resources sport psychology practitioners can provide for future generations.

If you choose to participate, you will be asked to complete a brief and anonymous online questionnaire, which will take approximately 8-10 minutes of your time.

We are seeking adults who experienced an injury (combat and training related) during their military service.

Research participants will be included if they are the following:
1. Have previously or are currently serving in a branch of the U.S. Armed Forces (including Active, Guard, Reserve, ROTC),
2. Experienced an injury during your service,
3. Lost at least 1 day of duty because of the injury.

Thank you for your time and your service!

If you are interested in this study and having the research team contact you directly, please select the "Yes, I'm interested" link below. By clicking the "Yes, I'm interested" link, your contact information will be released to the research team. If you select the "No, thanks." link or do not respond to this study message, your contact information will not be released to the research team.

Yes, I'm interested! **No**, thanks.

Thank you for your interest in ResearchMatch.

ResearchMatch Disclaimer
You are receiving this email message since you have registered in the ResearchMatch registry. Should you wish to edit your profile please click here to login and update your

profile.

ResearchMatch is a free and secure tool that helps match willing volunteers with eligible researchers and their studies at institutions across the country. ResearchMatch is only providing a tool that allows you to be contacted by researchers about their studies. ResearchMatch therefore does not endorse any research, research institution, or study. Any recruitment message that you may receive about a study does not mean that ResearchMatch has reviewed the study or recommends that you consider participating in this study.

If you no longer wish to be part of ResearchMatch, please remove your account by clicking here.

Appendix H

ResearchMatch Follow-Up Email

Julianne Giusti <mentalreadinessresearch@gmail.com> Mon, Jul 23, 10:36 AM

to bcc:

Thank you for your interest in the study entitled "Mental Readiness to Return to Duty Following Injury"!

This study will examine different aspects of injury rehabilitation and mental states during the return to duty phase. Participation only includes completion of a brief and anonymous online questionnaire, which will take approximately 8-10 minutes of your time.

Research participants will be included if they are the following:
1. Have previously or are currently serving in a branch of the U.S. Armed Forces (including Guard, Reserve, ROTC),
2. Experienced an injury during your service,
3. Lost at least 1 day of duty because of the injury.

If you have any further questions or are unsure if you qualify, please do not hesitate to contact me. Please feel free to share this survey on social media and with comrades.

Survey Access

Link: https://uidaho.co1.qualtrics.com/jfe/form/SV_6PZxqnFEoQFCB0N

Thank you for your time and your service!

Appendix I

Table I.1. *Refined Dimension Labels for the 36-Item MMRRII*

Dimension	Subscale	Item
Overcome Fear	OFA1	…I had surpassed limits (mental & physical) I was unsure I would reach.
	OFA2	…I had grown stronger through the adversity of the injury.
	OFB1	…I could perform my duties without limiting myself or over compensating.
	OFB2	…I had the ability to fulfill my duties without hesitation.
	OFC1	…I found a way to conquer my fears of re-injury.
	OFC2	…I had faced my fears of re-injury and was no longer afraid.
	OFD1	…I had accepted my injury as an obstacle but one that provided an opportunity to grow.
	OFD2	…I had taken the small steps in my rehabilitation incrementally over time and felt comfortable to return.
Confidence	CA1	…I no longer questioned if my body was prepared to return.
	CA2	…Confident that one small movement would not re-activate the injury.

Table I.1. C*ontinued*

Dimension	Indicator	Item
Confidence	CB1	…Confident because I had more knowledge on how to keep myself healthy and avoid re-injury.
	CB2	…Confident because I understood the proper rehabilitation movements to promote healing and prevent future injury.
	CC1	…Confident because I had focused on all of the small wins in the rehabilitation process.
	CC2	…Confident that I could continue to attain small success in my return to duty.
Motivation	MA1	…Motivated to return in order to contribute to my unit.
	MA2	…Motivated to return in order to participate in trainings and missions.
	MB1	…Motivated to come back stronger than before.
	MB2	…Motivated to prove to myself that I could be better than I ever was before.
	MC1	…Motivated to continue on the long slow path towards full healing.

Table I.1. C*ontinued*

Dimension	Indicator	Item
Motivation	MC2	…Motivated to build my capabilities over time.
Mission Focus	MFA1	…I could focus solely on the mission and not on my injured body part.
	MFA2	…I could focus on performing my role in missions and not worry about re-injury.
	MFB1	…Capable of recognizing when my focus on re-injury would make me a liability to my unit and/or missions.
Mission Focus	MFB2	…I was no longer a liability to my unit in our missions/operations because I didn't focus on my injury or possible re-injury.
	MFC1	…My identity was restored.
	MFC2	…My identity was no longer defined or dictated by my injury.
Support	SA1	…That those important to me recognized that medical tests aren't the only measurement of my level of readiness to return to duty.

Table I.1. *Continued*

Dimension	Indicator	Item
Support	SA2	…Supported in my mental recovery as much as my physical recovery.
	SB1	…My unit had my back during the recovery process.
	SB2	…My unit supported me upon my return to duty.
	SC1	…My chain of command had my back during the recovery process.
	SC2	…My chain of command supported me upon my return to duty.
	SD1	…My medical staff saw me as more than just a number.
	SD2	…Supported by the medical staff.
	SE1	…Maintaining social involvement with my unit supported my recovery.